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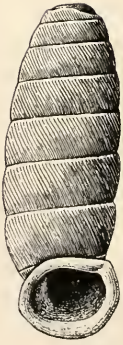

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VE DRYES: NEW JAMAICAN UROCOPTIDÆ

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NEW JAMAICAN UROCOPTIDÆ.

BY HENRY VENDRYES.

Cylindrella (*Anoma*) *inusitata*, Vendryes. Pl. I, figs. 1 and 2.

Shell much elongated, cylindrical, rimate, somewhat shining and transparent, color light brown; spire slightly tapering both above and below its greatest diameter, which is about the middle; truncate with the loss of 7 to 8 whorls, whorls remaining 11 to 12, planulate, shouldered by an early obsolete angle, the last detached and descending, strongly carinated at the base, the carina extending to the back of the aperture; striæ waved, strong and compact, crossing the whorls obliquely and continued up to and many crossing over the edge of the suture, which appears fringed here and there by their intrusion; aperture like that of *Dunkeriana*, but rather larger in proportion to the shell, and less oblique than in that species, well produced over the penult. whorl. Height 18 mm., greatest breadth above the middle of the spire, $3\frac{1}{2}$ mm.; aperture, 3 mm. high, $2\frac{1}{4}$ mm. wide.

This species is remarkable for its produced and detached aperture, placing it in the same group to which *princeps* belongs. Specimens were received from Mr. Bancroft, who collected them on the mountains at Upper Leighton, near Spring Garden estate in the parish of Saint George.

Cylindrella (*Anoma*) *cognata*, Vendryes. Pl. I, figs. 3, 4.

Shell rimate, cylindrical, elongated, color very light pale brown; spire tapering from the last whorl to the summit; apex truncate, with the loss of 7 to 8 whorls, whorls remaining 11 to 12, subplan-

ulate, slightly shouldered, the last detached and descending, strongly carinated at the base, carina continued to the back of the aperture; striæ very strong and compact, irregularly spaced and waved here and there, some crossing over the sutures from one whorl to the other; aperture as in *inusitata*, but less elliptical, well produced beyond the penult whorl. Height, 15 mm.; greatest breadth, 3 mm.; aperture, $2\frac{1}{2}$ mm. high, $2\frac{1}{4}$ mm. wide.

I am indebted for specimens of this shell to Mr. Hart, at one time Superintendent of Public Gardens and Plantations in Jamaica, and now occupying a similar position in Trinidad, by whom they were collected at the government cinchona plantations in the mountains of Saint Andrew, about 5,500 feet above sea level.

One of the specimens being alive, I obtained the radula, but failed in securing the buccal plate. The teeth are of the type common to MM. Crosse & Fischer's first group A. of Cylindrellæ. The animal is very small in proportion to the shell. It is spiral behind the mantle, short, of a pearly-white color, slightly mixed with green, and marked with close-waved, narrow, longitudinal brown lines, not extending to the lapping of the foot; head short, with a simple labial appendage, apparently incapable of much projection; eye peduncles short, slender, of a deep bistre color, except on the lips, where the color is like that of the body; eyes very black, placed on the bulb-shaped tips of the peduncles; tentacles short and very slender; foot broad and lance-shaped behind. The animal is very active for a Cylindrella. It progresses by extending forward the forepart of the foot and drawing the afterpart up to it in a sort of wave. Part of the shell drags lightly on the ground and is carried forward with each fresh advance of the foot.

Cylindrella (*Anoma*) *propinqua* Vendryes. Pl. 1, figs. 7, 8.

Shell rimate, cylindrical, nearly white, under a light brown epidermis, which becomes paler towards the apex; the spire widens very gently from the base of the penult whorl to about one-third above it, where the greatest diameter is reached, and thence it tapers to the truncate apex; apex truncate with the loss of 8 to 9 whorls, whorls remaining 10, less deep and less flattened than on *Dunkeriana*, the first two above the base subangular about the periphery, the last more strongly carinated than in *Dunkeriana*, with the carina continued down to the base of the aperture; striæ very strong, compact and

wavy, extending across the whorls to the very edge of the well-impressed suture; aperture oblique like that of *Dunkeriana*, but the peristome is thinner and is appressed above to the penult whorl. Height 13 mill., greatest breadth at the slender part of the spire 3 mill.

The shell comes near to *Dunkeriana*, but it has 10 whorls which are less planulate than on that species, and the striation is rather coarser and less regular; the color of *Dunkeriana* is also different. Gloyne, in Journ. de Conch., vol. —, reports it as *similis* from Bellevue. Bland had identified them with great doubt as *similis*. On closer examination they turned out to be unlike *similis* or any other Jamaican species of Anoma.

Hab.: Bellevue, near Stony Hill, in the parish of Saint Andrews, (!) Vendryes. (!) Gloyne.

Cylindrella (*Thaumasia*) *sanguinea* Pfeiffer, var. *perplexa* Vendryes. Pl. I, figs. 11, 12.

This variety was collected at (!) Water House, an abandoned sugar estate, now turned into a grazing pen and negro provision grounds, in the upper northern portion of the Liguinea plain, where the limestone hills of the Red Hills range begin to rise. The aperture is produced and the peristome is detached all round; whilst in the typical *sanguinea* the peristome above is closely soldered to the body-whorl, and often so much attenuated at the point of attachment as to form a thin film. The shell is of medium size and dark colored; there is a narrow line of a deeper tint than the ground color, but rather dingy, running next to the suture along the lower part of it and extending to within it. This form is very persistent in the locality mentioned.

Cylindrella (*Anoma*) *abnormis* Vendryes. Pl. I, figs. 5, 6.

Shell deeply rimate, cylindrically elongated, color brown with a very slight tint of yellowish-red, shining; spire broadly truncate with the loss of — whorls, whorls remaining 9, the last and the three following it are more drawn out and consequently deeper than the remaining ones, the last is slightly narrower in diameter than the second, the second than the third, and the third than the fourth, thence the remaining whorls become less deep and gradually diminish in diameter to the truncated apex, so that the outline of the shell presents the form of a long, narrow, drawn-out purse, somewhat

bulging about the middle, and thence tapering towards the bottom; whorls slightly convex, obtusely angulated at the periphery, sculptured with strong, thick lamella-like costulæ crossing the whorls obliquely, generally curvilinear, irregular in some places and wavy here and there, extending to the very shoulder of the whorls, the last whorl with a prominent carina which extends to the back of the base of the aperture close to the peristome; suture well incised; aperture inclining to the right, the plane very oblique, peristome thick, nearly white, smooth and shining, reflected all around, with a very large, strong, elevated knob close over the spot where the columellar lip should merge into the columella, and apparently arched over the space of the entering rima beneath. Total length, 11 mm.; greatest breadth at middle of spire, 3 mm.; next above the aperture, 2 mm.; at the truncation, 2 mm.

This shell was collected by me among fine earth and vegetable debris taken from the roadsides near to Brown's Town, in the parish of Saint Ann. Unfortunately, as its presence was only revealed to me when searching this debris some time afterwards at home, no note was kept of the exact habitat and station. It is as yet unique in my collection. It is unlike any species of Anoma with which I am acquainted, and its peculiarities would seem to warrant the creation of a new subgenus, or at least of a special section to receive it. The reasons for this appear to me to be as cogent as were those which led to the creation of the subgenus Chittya for *Geomelania sinuosa*.

Cylindrella (*Thaumasia*) *instabilis* Vendryes. Pl. I, figs. 9, 10.

Shell ovate-cylindrical, solid, rimate; color dark-sanguineous, not unlike that of some specimens of *Cyl. sanguinea*, but the surface of *instabilis* exhibits in most specimens semi-hydrophanous, more or less wide, transverse patches sparsely and irregularly occurring, and apparently produced by some indistinct lesions of the very thin epidermis; spire describing a well-drawn-out ovate outline; apex broadly truncate with the loss of 6 to 7 of the earlier volutions, whorls remaining 7 to 8, almost entirely plane in some examples, or moderately convex in others, subarcuately, obliquely and closely costulate striæ; the last whorl not detached in some examples, and detached and produced in others, and generally more strongly sculptured than the penult and other whorls, with a well-pro-

nounced carina at the base; suture lightly impressed and submargined; aperture slightly oblique, circular in some examples or transversely narrowed in others; peristome slightly tinged with the prevailing ground color of the shell, well expanded all around and reflected, not continuous above, but attenuated or reduced to a mere film and appressed to the body whorl in some examples, or in others detached and continuous, and produced outward near the upper part of the right side of the aperture and with a sinus or notch on the produced part. Long., 24 to 25 mm.; diam. at middle of spire, 9 to 10 mm.; aperture with peristome appressed, 8 mm. high and wide; when produced and with peristome detached, 6 mm. high, and 6 to 7 mm. wide.

In several of its characters this species is rather inconsistent. In specimens found side by side and manifestly of the same brood, some examples show strong affinities with *Thaumasia sanguinea*, others with *Thaumasia cylindrus*, others again with *Gongylostoma lata* (? *Thaumasia lata*), in so far that it becomes often very difficult to locate them decisively.

In the two specimens figured, one has the lip appressed, as in *sanguinea;* in the other it is detached and expanded towards the right side of the aperture and bears a notch or sinus. In one the sculpture is decidedly like that of *sanguinea*, on the other it is like that of *cylindrus*, but stronger. In specimens with the aperture but slightly produced and the peristome *uninterrupted* by attenuation and adhesion to the body whorl, or produced and *not* bearing a sinus, the resemblance to *lata* is very great.

Habitat: (!) Phœnix Park, near the Monarque in the parish of Saint Ann; (!) environs of Brown's Town in the same parish.

NOTES ON MESESCHIZA GROSVENORII LEA.

It is now over thirty-seven years since Mr. Lea described this species, and additional specimens have not been reported. In his Monograph of the family Strepomatidæ, Mr. Tryon says, in a foot-note page 350, "every specimen examined shows evidence of diseased growth." In the description, the location of notch is stated to be inconstant or wanting. Admitting then that the notch of this species is a deformity, where should the specimens described by Mr. Lea be placed? The notch being a deformity, the genus would not stand, because that

is the distinguishing point of the genera, like the fissure of Schizostoma. I am of the opinion that Mr. Lea's specimens are young *Angitrema armigera* Say, for the following reasons: The young of *armigera* is generally smooth, is fusiform, thin, obtusely conical and of various shades and markings, from a light straw-color to purple, occasionally seven banded while six is common; the aperture is large and rhomboidal, obtuse longitudinal thickenings are common on body whorl, a light line under the suture is also common in banded and purple specimens, base channel well defined. Polar point of the operculum well removed from the margin. There is no other species found in the Wabash that has so many points of resemblance; about the only point of difference is the number of whorls, five to six in the young *armigera* I have, while Mr. Lea's description says seven.

There are some other species I think must be referred to *Angitrema armigera*, but additional specimens from other localities are needed to fully determine the identity.—A. A. Hinkley.

THE SUBSPECIES OF PYRAMIDULA ALTERNATA.

BY HENRY A. PILSBRY.

Pyramidula alternata knoxensis, n. v.

A more robust, larger shell than typical *P. alternata*, with more widely open umbilicus; dull rusty brown, with comparatively inconspicuous or much-reduced flame-markings. Whorls $5\frac{1}{2}$, not carinated. Sculpture of fine and even rib-striæ, but little weaker on the base, the whole covered with a secondary sculpture of fine wrinkles, partially cuticular, and running a little more obliquely than the rib-striæ. This minute wrinkling is barely visible to the naked eye, but is much stronger than in other forms of *P. alternata*, and gives the surface a peculiarly dull appearance.

Alt. 11, diam. 23, width of umbilicus $6\frac{1}{2}$ mm. (Knox Co., Tenn.).

Alt. 11, diam. 23, width of umbilicus 7 mm. (Laurel Creek Gap).

Alt. 13, diam. 25, width of umbilicus $7\frac{1}{2}$ mm. (Hazel Creek).

This remarkable race of *P. alternata* belongs, so far as we know, to the valleys of the western slope of the Great Smoky mountains, extending into the valley of East Tennessee. It was first found by Mrs. George Andrews, in Knox county, Tenn. During the past summer Mr. Jas. H. Ferriss found it in Cade's Cove, at Laurel Creek,

Gap and Hazel Creek. We saw nothing of it on higher elevations in the Great Smokies, the localities mentioned lying below 2000 ft. elevation. In the collection of Geo. H. Clapp there is a single shell from the Jas. Lewis coll. labeled "Philadelphia, Monroe Co., Tenn.," probably collected by Miss Law, and measuring: Alt. 13, diam. 24, umbilicus 7½ mm.

No intergrades with typical *P. alternata*, *P. a. carinata* or *P. a. costata* have been observed. It is remarkable for the strong development of the secondary sculpture, with fine primary sculpture of rib-striæ, the unkeeled, capacious whorls, wide umbilicus, and dead, rusty surface. Messrs. Clapp and Ferriss agree with me in considering this a strongly differentiated subspecies.

The following subspecies of *P. alternata* are now recognized:

P. alternata (Say).

P. alternata fergusoni (Bld.). N. Y. to Md.

P. alternata rarinotata Pils. Texas.

P. alternata carinata Pils. Pa. to Tenn., in western division of the Appalachian Mt. system.

P. alternata knoxensis Pils. Knox, Blount and Monroe Cos., Tenn.

P. alternata costata 'Lewis' Clapp. Greaty Smoky Mts.

P. alternata mordax (Shuttl.). Great Smoky Mts. (?)

The last variety has not yet been rediscovered; the "*mordax*" in collections being referable, so far as I have seen, to a strongly-ribbed form of *P. alternata*, which has not been named; and not fulfilling the requirements of Shuttleworth's diagnosis. *P. alternata carinata* includes strongly angular or keeled, but finely striate shells of the mountainous region from western Pennsylvania to Tennessee. It was defined in my paper on Rhoads' Tennessee shells; and is not known to occur in the Tenn.-N. C. boundary ranges. I have never seen any true intergrades between *P. alternata* and *P. cumberlandiana*, and consider the latter a well-defined species.

There is also a color var. *alba* Tryon, of *P. alternata* (Amer. Journ. of Conch. ii, p. 261, and Monog. Terr. Moll. U. S., p. 49). This occurs abundantly in certain localities within the area of typical *alternata*. Thus in Philadelphia, *alba* is found along the Wissahickon Creek, while in other localities in this vicinity the ordinary *alternata* is found. This color-var. is not really white, but merely albinistic; it lacks the spots and flames of the typical form. It is also found in Michigan, etc.

GENERAL NEWS.

Polygyra thyroides sanctisimonis n. var.—Spire more conic than in thyroides, composed of $5\frac{1}{2}$ whorls which are more closely coiled; body-whorl decidedly more depressed; umbilicus open. Aperture smaller than in *thyroides*, transversely elliptical, being much less rounded than in *thyroides*. Shell rather solid, with opaque cuticle, often more yellow than in thyroides. Alt. 15, diam. 23 mm. St. Simon's Island, Georgia.—H. A. Pilsbry.

Helicostyla carinata Lea, and H. dactylus Brod.—In the Manual of Conchology, viii, p. 22, I showed that Lea's *Bulimus carinatus* is identical with and was published prior to *Bulinus dactylus* Brod., and consequently should be accepted in place of the latter. This decision must now be reversed, on account of the earlier *Bulimus carinatus* Perry, 1811, which preoccupies Lea's name, and which I was not aware of when the ruling was made.—H. A. Pilsbry.

Note on two species of Cantharidus.—It has not been noticed, I believe, that *Bulimus eximus* Perry, Conchology, pl. 30, f. 2 (1811), is identical with *Cantharidus badius* Wood (18—), and *Bulimus carinatus* Perry, f. 1, is *C. peronii* Phil. (1850). Perry's figures are very good, for him, and quite recognizable. He gives Van Diemen's Land as locality for the former, New Holland for the latter species. So far as I can see, his names will stand for these species.—H. A. Pilsbry.

Amphidromus lævus (Müll.).—In my account of this species in the *Manual of Conchology* (1900) the "*Helix læva*" of Müller was called *Amphidromus lævis*. Mr. G. H. Chadwick has called my attention to the mistake, Müller's word being the adjective *lærus*, left, referring to the sinistral or "left-handed" coil of the shell. —*H. A. P.*

A new Triassic Chiton.—Mr. Otto Jaekel describes (Zeitschr. der Deutschen geologischen Gesellschaft, vol. 52, 1900, p. 9) a new form from Rüdersdorf as *Trachypleura triadomarchica*. All of the

valves are preserved in place, with fragments of the girdle. The valves lack insertion-plates, and also otherwise have the general characters of the modern *Lepidopleurus*, while the girdle is armed with spines which are believed by Jaekel to have been calcareous. The length, without girdle, is about 16, breadth 9 mm. The genus is evidently extremely like *Lepidopleurus* in hard parts, and so far as the figures and description show, indistinguishable from the recent genus except in the character of the girdle armature. It is quite unlike any of the known Palæozoic genera.—*H. A. P.*

PUBLICATIONS RECEIVED.

Synopsis of the Family Cardiidæ and of the North American Species. By William Healey Dall. Proc. U. S. Nat. Mus. Vol. xxiii, pp. 381–392, 1900.—As Tryon and Pilsbry's "Manual of Conchology" does not yet include Pelecypoda, the necessity for monographs giving the latest investigations in systematic changes is apparent. Students are deeply indebted to Dr. Wm. H. Dall for his recent monographs on several families of bivalve mollusks, including the Mactracea, Diplodontidæ, Leptonacea, Psammobiidæ, Solenidæ, Tellinidæ and Cardiidæ.

In the bulletin on Cardiidæ there are no plates, but there is a bibliography followed by a synopsis of the family which includes a "subdivision of the family included as a whole." The "brackish water forms associated with *Adacna*" are no longer included in this family.

The principal changes in nomenclature of the East American species since Dr. Dall's "Marine Mollusks of the South Eastern Coast," are as follows:

Cardium magnum Born is included under the name of *C.* (*Dinocardium*) *robustum* Solander, which is the older name; this does not include *C. magnum* Linnæus, which Dr. Dall thinks is probably *C.* (*Trachycardium*) *leucostoma* Born. In subgenus Papyridea, *spinosum* takes the place of *bullatum*, or *bullata*, of "many authors but not of Linnæus," and *P. petitianum* Orbigny is a synonym of *P. semisulcatum* Gray. *Liocardium lævigatum* is a synonym of *Cardium* (*Lævicardium*) *serratum* Linnæus.

The West American species include Cardiums found in the Gulf of California and ranging further south. This adds to the number of West Coast species.

Collectors who have readily detected a varietal difference in the lighter weight of shells sent out as *Cardium nuttallii* Conrad, may regret that these shells are not recognized even as a variety, but are included in the synonym of *Cardium* (*Cerastoderma*) *corbis* Martyn. *Cardium blandum* Gould is a synonym of *C.* (*Cerastoderma*) *californiensis* Deshayes. *Cardium* (*Cerastoderma*) *ciliatum* O. Fabricius (*C. islandicum* Chemnitz (a synonym) and *Serripes grönlandicus* Gmelin are Arctic sea species that are found on the Atlantic and Pacific shores. *Cardium aspersum* Sowerby is listed as a variety of the eastern coast *Cardium* (*Papyridea*) *spinosum*.

Dr. Dall says *Cardium* (*Lævicardium*) *elatum* Sowerby "is the largest species of the genus." We have often noted the variation in shape of some of the large cardiums of the West Coast; he says of these oval and rotund forms that they may possibly be correlated with sex.—M. B. W.

Description of a New Species of Unio from the Cretaceous Rocks of the Nanaimo Coal Field. By J. F. Whiteaves (Ottawa Naturalist, XIV., Jan., 1901). *Unio nanaimoensis* n. sp. *Unio hubbardi* Gabb is stated to be from the Cowgitz coal mine, on Graham Island, one of the Queen Charlotte Is., and probably did not come from Vancouver Island, as originally reported.

Notes on some Land and Freshwater Mollusca from Fort Chimo, Ungava Bay. By J. F. Whiteaves (Ottawa Nat., XIV., March, 1901). The specimens were collected by Mr. W. Spreadborough in 1896, and comprise *Limnæa palustris* var. *vahlii* *Planorbis arcticus* ("which may be only a synonym of *P. parvus*,") *Valvata sincera* and *Pisidium steenbuckii*. Notices of previous records of non-marine mollusks of Labrador are given.

Additions to the Marine Mollusca of the Bermudas. By A. E. Verrill and Katherine J. Bush. The Nudibranchs and Naked Tectibranchs of the Bermudas. By A. E. Verrill. (Trans. Conn. Acad. of Sci., X., 1900). The additions to the fauna recorded in these articles are mostly from the collection made at the Bermudas in April and May, 1898, by the Yale scientific party under Professor Verrill. In the first paper about 80 species are recorded for the first time from the Bermudas, 25 of

them being described as new, among them a new *Siphonaria*, 6 *Eulima*, several *Odostomia* and *Cæcum*. In dealing with the *Terbonillidæ*, the groups *Mumiola* and *Mormula* (Adams, 1864) are subordinated to *Pyrgostelis* (Monterosato, 1884), though Adams' names have priority. The dentition of *Synaptocochlea picta* is figured, and its operculum said to have few whorls.

In the second paper, Prof. Verrill records *Aplysia dactylomela*, *A. Willcoxi* (?) and *A. megaptera* n. sp. The latter is a fine species a foot long. *Pleurobranchopsis* is a new genus for *P. aurantiaca* n. sp., a form with no shell, mantle-edge free throughout, gill sessile; the radula and jaws are not described. 6 species of *Doridida* are described.

Transactions of the Wagner Free Institute of Science, III, *Contributions to the Tertiary Fauna of Florida*.—We have more than once in these pages alluded to the importance of this publication to the general student of recent mollusks, no less than to the paleontologist. The production of such a work is evidence of an enlightened appreciation of the value of these investigations, on the part of the Trustees of the Wagner Institute, no less than a high ideal of scientific work on the part of the author, Professor Wm. H. Dall. The esteem in which the *Transactions* are held by foreign students is shown by a recent letter from the Australian conchologist, Charles Hedley, an extract from which we venture to print:

"I am most gratified at receiving the volume on the Tertiary Mollusca of Florida, but in thanking you for the copy I must also thank you for the labor you have placed at the disposal of every student. I cannot sufficiently express what a boon to me is the generic revision of the various groups. After struggling with the scanty and perplexing literature of bivalve hinge structure, I can greet your work as a ship-wrecked mariner might greet the shore. For instance, I have had a quiet little fight with *Mysella* and have drawn the hinges ready for publication. But I had laid aside the notes and sketches till I could better comprehend the matter. My unsuccessful struggles at least enabled me to appreciate the cost of labor and talent in producing the synonymy of *Rochefortia*. Those who have daily intercourse with fellow workers, who can consult great museums and splendid libraries, will thank you in their turn. But as a scientific exile, without these advantages, allow me to tell you how your Mollusca

of Florida smooths my path, so that I may do with accuracy and speed what I formerly did slowly and painfully."

Apology is due to Mr. Hedley for this unauthorized use of a private letter, and also to Professor Dall.—Eds.

CORRESPONDENCE.

Editors Nautilus: In the remarks of our friend Hemphill, on pp. 139–140 of the April number, some of us are called to order for a phraseology which is not altogether agreeable to him and other workers on the Pacific coast, and may properly be modified in the interest of their feelings. I refer to expressions which refer to the habitual nomenclature of some shell under discussion, in the cabinets of collectors on the Pacific shores, as in error. I suppose I have been one of those whom he criticises; for being familiar with most of the West coast collections, lists and nomenclature, it has often seemed useful to refer to the name in common use on the other side of the continent, when in the course of monographic revision it has been found to be untenable.

But I should like to assure Mr. Hemphill and all others who have been displeased by such expressions that nothing was farther from my mind than to reflect on the care or desire for accuracy of West Coast workers. I have been of and among them so many years that I feel entitled to claim a place in their ranks, and a large part of the work I have done has been intended to assist them to the extent of my ability. No one is infallible, at least outside of the Vatican. No one can correct the errors of a nomenclature at one fell swoop, so to speak. I have named many thousands of shells for West Coast correspondents, and I have named many of them wrong. That is, I have given names which were at the time in current use, but which subsequent researches have shown to be untenable. If Methuselah was a conchologist, he probably did better toward the end of his career, and the heirs of his original correspondents profited thereby. But alas! these are degenerate days, and in forty years or so one does not ferret out all anterior mistakes. Therefore if one's gratuitous service does not prove infallible, and one's expressions not invariably happy, let our West coast friends hold fast to the theory of friendly intent, and believe we at the East mean to do our best by them every time. —Wm. H. Dall.

The Nautilus.

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COLLECTING IN HAITI.

J. B. HENDERSON, JR.

On the 30th of November last, Mr. C. T. Simpson, of the Smithsonian Institution, Mr. Robert T. Hill, of the Geological Survey and myself, sailed from New York for Haiti with the intention of making as thorough conchological exploration of that island as a time limit of two months would permit. Although Haiti has been visited by Bland, Sallé, Rolle, Weinland and others, it may yet be considered almost a *terra incognita* to the collector of land shells. Many of its great mountain ranges and deep valleys have never been reached by naturalists; even its more accessible regions have been but superficially examined. Imagination gilds the unknown, and we debarked at Cap Haitien eager to get into the field without a moment's delay.

Cap Haitien is situated upon the coastal margin of an extensive plain; but just back of the town rises an isolated group of high hills which appear to have no connection with the northern main range of mountains. These hills are composed of hard, flinty rock, resembling the formation of the Blue Mountains of Eastern Jamaica. In the absence of limestone they support a scant molluscan fauna, and our first day's collecting proved a bitter disappointment. Not more than fifteen species rewarded our most diligent labors, but among these were some interesting finds—notably a Lucidella of decided Jamaican affinities.

Leaving Cap Haitien we made our first interior journey horseback to Milot, at the foot of the main range, where amid the ruins of the famous palace of Sans Souci and in the dungeons of the old

fortress of La Ferrière we hoped to discover the habitat of that prince of American Helices—*Pleurodonte gigantea*. At an elevation of about 3000 feet, we came upon the first evidences of our game in the numerous dead shells of that superb species. Scattered about the bases of huge limestone fragments which were heavily draped and festooned in richest tropic verdure were thousands of dead *P. gigantea*, but not a trace of a living animal. We remained several days at Milot, but captured only three living examples of *gigantea* and took not more than a dozen fairly good cabinet specimens. Although disappointed in this respect we were cheered by a splendid bag of Cylindrellas, Helicinas, smaller Helices, *Stenogyra* (s. s.) *Opeas*, *Subulina* and several *Tudora* and *Chondropoma*.

One of the finest Helices of the West Indies is the large and exceedingly handsome *P. undulata*. This species is abundant about the foot of the mountains near Milot. Swarms of half naked children followed us about, often annoying us to the point of desperation, but these bright little urchins proved to be clever collectors. Finding that we rejected all dead shells of *P. undulata*, they brought us worn and useless specimens into the apertures of which they had carefully inserted large slugs. As this method failed them they recovered some living but immature specimens which we had thrown away, and extracting the animals, they reset them in dead shells and solemnly offered them to us again. The most notable catch on the mountain of La Ferrière is a small operculate with free whorls all in the same plane, probably a new genus.

Returning to Cape Haitien we took a steamer for Port au Prince, where we remained a full week, collecting most industriously in the neighborhood. The excessive dryness of the season caused living land shells to be scarce, but we succeeded in making a remarkably good catch, notwithstanding adverse conditions. In this part of the island the larger Helices disappear; *P. undulata* is replaced by the smaller *P. crispata* and a larger proportion of operculates is apparent. *Macroceramus* is encountered and *Cylindrella* is more abundant.

The prevailing type of operculate in this part of the island is represented by the well-known *Chondropoma semilabre*, barrel-shaped, whitish in color and with a descending and slightly free last whorl. This last characteristic runs through nearly all the Cyclostomacea of the island. As a persistent feature it finds no counterpart elsewhere in the West Indies.

Perhaps the particular feature of our Haitian journeys was our trip to Lake Assuei, one of the two great interior lakes of Haiti and Santo Domingo. The fauna of this large body of water is wholly unknown and there can be no doubt that its clear depths would furnish many treasures to the zoölogist provided with a good dredge. But we had neither dredge nor boat. An examination of one-half mile of shore line revealed a Hydrobia and a Physa, but no trace of Naiades or Sphæria. Amid the grandest scenery, we collected over the mountains north of the lake with fairly good success. One Chondropoma (evidently new) should receive some name signifying "splendid."

In a grove of very large trees near the lake we experienced several hours of the keenest delight in gathering *Liguus virginea* and *Pleurodonte bizonalis*. The former is no doubt the most beautiful of all land shells; the latter is considered a rarity. I know of no more thrilling experience than our sudden discovery of a hundred of these exquisite Liguus.

At St. Mark, Jeremie and Jacmel we toiled like madmen to exhaust those regions of their special faunæ; our catch from the last two stations being principally in *Cylindrella*, *Helicina*, *Glandina*, *Eutrochatella* and the smaller helices of the *Cepolis* group. The collection about Jeremie is exceedingly rich, but the unfriendliness of the natives is more pronounced at that city than elsewhere in the island.

One can scarcely picture a more promising-looking region for snail life than the environs of Jacmel. There are mountains and deep valleys, shaded and cool, sparkling streams, moisture and limestone, everywhere. We were amazed, however, to find the region almost barren of mollusks, a fact that seems wholly unaccountable.

Fortunately time seems to magnify in the mind the pleasant features of rough travel, while disagreeable episodes gradually fade from the memory. The oppressive climate, the wretched food and accommodations, the unsanitary condition of the cities, the vermin and larger insect pests, the stupid ignorance and arrogance of the official classes, the difficulties of interior travel, render Haiti all but impossible. We left Jacmel for Kingston, Jamaica, rejoicing in our flight from that land of dark superstition and filth.

Our material has not yet been overhauled, but I may, with due caution, state that Haiti is not so rich conchologically as Jamaica or

parts of Cuba, though richer probably than is Porto Rico. The distribution of its shells is far more general than as recorded in Crosse's list, and the affinities between the faunas of North Haiti and Cuba and South Haiti and Jamaica are not so decidedly marked as heretofore supposed.

The presence of a large number of the Thaumasia group of Urocoptidæ in the Southern peninsula is significant, yet we encountered Lucidella, Stoastoma and a probable Sagda in the north.

ALASMIDONTA MARGINATA SAY.

In the April number of the Nautilus Professor Charles Le Roy Wheeler calls attention to the above species and is in doubt whether this name should be applied to the somewhat solid, inflated, rhomboid western shell, or the less inflated, thinner, triangular form from the Atlantic drainage. I am glad Professor Wheeler has called attention to this, because at the time I made up the account of Say's species for the Synopsis I overlooked the fact that it had just been published in the Journal of the Academy of Natural Sciences. In Dr. Dall's copy of the paper on Conchology by Say in the third edition of Nicholson's Encyclopedia, Say says: "Found in the river—" leaving it to be understood that he was not certain where it was found. Immediately after the dash there is written in ink "Delaware."

The description is not very clear, but I was inclined to believe that it applied better to the eastern than the western form. Say says that his shell is transversely oblong-suboval, and this outline applies best to the eastern shell, which is often irregularly obovate, while the western form is almost invariably rhomboid. He states that it is bluish-white within, with a white margin. The eastern form is sometimes colored within in this way; in the western specimens the border is generally darker than the rest of the interior. The length given, $2\frac{1}{2}$ inches, agrees better, I think, with the eastern shell than with the western one, which runs from 3 to $4\frac{1}{2}$ inches, though of course Say might have had a young specimen of the heavy rhomboid form before him.

He says that it was communicated to him by Mr. Lea, who found it in the Scioto River. I am doubtful whether Dr. Lea ever col-

lected in that river. Most of his shells from Ohio were collected by Mr. T. G. Lea or other resident collectors in the State.

It is probable that Say's type is lost. I could not find it when I went over the Academy's collection and made notes on his species, and since the publication of Professor Wheeler's note Mr. Vanatta has kindly made a search for it, and fails to find it.

I confess that I am in doubt as to what Mr. Say had before him when he described his *Alasmidonta marginata*, though I am inclined to think it was the eastern form. In case it should be shown that Say's name applies to the western shell, the name *Alasmidonta varicosa* Lamarck, could probably be used for the Atlantic drainage species.

NEW VARIETIES OF FRESH WATER SHELLS.

BY FRANK C. BAKER.

Limnæa reflexa jolietensis, n. var.

Limnæa reflexa attenuata, Baker (non Say), Trans. St. Louis Acad. Sci., Vol. IX, p. 20, pl. 1, fig. 4, 1901.

Shell with an attenuated spire, the whorls, seven in number, being very convex and the sutures very deeply impressed; aperture about a third the length of the entire shell, ovate, thickened on the inside by a heavy callus; peristome thin; columella covered by a heavy callus and with a prominent plait; color light horn, frequently blackened by the carbon dioxide in the water, aperture of same color, the internal callus edged with dark brown or red.

Length 24.00; width 8.00; aperture length 9.50; width 5.25 mill.
Length 23.00; width 7.75; aperture length 9.00; width 5.00 mill.
Length 22.00; width 7.00; aperture length 8.75; width 4.75 mill.
Length 29.00 mill. (Bryant Walker collection).

Distribution: Joliet, Illinois (J. H. Ferriss); Saginaw River, Michigan (Bryant Walker).

Remarks: In the publication mentioned above the writer was led into the error of identifying the Joliet specimens as *attenuata* Say. Mr. Bryant Walker, to whom specimens were sent, has called the writer's attention to the true characters of *attenuata* and to the fact that the Joliet specimens are a distinct and undescribed variety of *reflexa* The peculiar loosely coiled whorls, attenuated spire and labiate lip will easily distinguish this variety.

In Bull. No. 3, Vol. II, of the Chicago Academy of Sciences, the writer published an account of the anatomy of *Limnæa emarginata* var. *Mighelsi* in which several errors appeared. The first was the position of the kidney and ureter as figured on plate VI. K. U. An examination of a larger and more perfect specimen shows the shape and position to be different, the ureter really proceeding from the anterior end and extending in a straight line to the edge of the mantle. It is needless to add that the renal organs, as figured on this plate, do not exist in the fresh water pulmonates.

On plate III of the same paper is given a figure of the genitalia in which a flagellum is described (E. F.). This is the vas deferens and the duct thought to be the vas deferens is the penis retractor muscle.

NEW LAND SHELLS FROM THE LOO CHOO ISLANDS AND JAPAN.

BY HENRY A. PILSBRY.

Mr. Hirase, continuing his researches, has recently taken steps to procure shells of the Loo Choo Islands; some of the first-fruits being noticed below. He writes: "I have sent two able collectors, in the hope that I may procure for study the land shells of Kiushiu and Loo Choo. They were sent at first, on February 23d last, to Yaeyama, in the Loo Choos, for a stay of two months; but because of malaria they were obliged to leave, and thus spent only twenty days there. They are now working in the neighboring island of Nawa, in the Loo Choo group."

Among the species sent from Yaeyama are *Clausilia hyperoptyx* Pils., *C. Stearnsii* Pils., *Bifidaria armigerella* Reinh., and *Georissa japonica* Pils. The last two species were originally described from the main island of Japan, Hondo; and their occurrence in the middle Loo Choo group extends their distribution notably. The specimens are, however, quite typical. The finding of a typical species of the Chinese group *Buliminopsis*, *B. meiacoshimensis* A. & R., which Mr. Hirase sends from Yaeyama Island, and a species of *Tornatellina*, is extremely interesting. The latter genus has not been reported nearer than Luzon, so far as I know. Of *Buliminopsis* two species have been described from the Loo Choo Is., *B. meiacoshimensis* Adams and Reeve, described as a *Bulimus*, and

hitherto referred to *Stenogyra*, and *B. turritus* Gude, described as *Ganesella*, though Mr. Gude suggests that it may be a *Buliminopsis*. Although I formerly thought *turrita* a *Ganesella*, the sculpture of fresh specimens is so similar to *Buliminopsis* that I have now little doubt that Gude's surmise was correct. It resembles the Chinese *B. buliminoides* Hde. in shape, but the latter, from a specimen received from Pere Heude, is narrower and less acutely keeled. Dr. Fritz Wiegmann has recently shown that *Buliminopsis* has essentially the organization of the genus *Eulota*, and therein is perhaps nearest to *Cathaica*. His investigations show that there are no important anatomical differences between the numerous subgenera which I have subordinated to *Eulota*. The characters intergrade by easy stages. Even *Buliminopsis* is anatomically an *Eulota*.

At Shunashiri, Loo Choo group, a form of *Eulota* (*Plectotropis*) *scepasma* Pfr. occurred, having 6½ whorls and a more depressed contour, being thus more acutely carinate. It measures, alt. 10½, diam. 21 mm., and is densely covered, like the typical form, with short, triangular, cuticular scales. *Plectotropis pachysoma* Ehrmann, is evidently a synonym of typical *E. scepasma*.

Trishoplita collinsoni var. *casta* nov. Shell rather openly umbilicate, depressed, with conic spire; white with a brown line at the periphery, showing above the suture on the spire. Surface shining, minutely striate, rather faintly decussate beneath, microscopically papillose. Whorls 6, slowly widening, the last very obsoletely angular at the periphery, becoming rounded towards the aperture, convex beneath. Aperture oblique, shortly oval, slightly lunate, the penultimate whorl excising a segment of about one-fourth the circumference of the peristome; lip white, narrowly expanded above, the outer and basal margins reflexed.

Alt. 8.6, diam. 12.5; length of aperture 5.5, width 6.3 mm.

Alt. 10, diam. 12; length of aperture 6, width 7 mm.

Obi, Prov. Hyuga, in eastern Kiushiu (Mr. Y. Hirase).

This species is somewhat more conical than *T. tosana* Gude,[1] with an umbilicus of about the same width or a little smaller. It has about the form but not the coloration of *T. cretacea* var. *bipartita*, and is apparently allied to *T. collinsoni* (A. Ad.) and *T. lischkeana* (Kob.), both of which have similar coloration. *T. collinsoni* was described from "Tago," which I take to be Tako, a place at the west-

[1] The name *tosana* Gude has three days priority over *suprazonata* Pilsbry.

ern end of Shikoku Island. It has not been figured, but is said to be "globoso-conica," "late perforata," with a wide peripheral band and lunate aperture. None of these terms would I apply to the shells before me, though it is by no means impossible that my species is a variety of that of Adams. *T. lischkeana* is from Hagi, on the north coast of western Hondo. It is a smaller shell than *T. casta*, with narrower umbilicus. When these forms of *Trishoplita* are better known, I believe they will be seen to fall under a few specific heads, like the *peliomphala* group of *Euhadra*. It is likely that *collinsoni*, *casta*, *lischkeana*, *bipartita* and *cretacea* are varying races of one species, and will be found to intergrade on the confines of their several areas. *T. collinsoni* is the senior name for the group, which has about the distribution of *Eulota callizona* var. *maritima* G. & P. —Shikoku, eastern Kiushiu and western Hondo.

Trishoplita hiugensis n. sp. Shell depressed, rather narrowly umbilicate, brownish yellow, the suture bordered below with a narrow white band; very glossy, finely striatulate. Spire low-conic, the apex obtuse. Whorls $4\frac{3}{4}$, convex, the last slightly deflexed in front, indistinctly angular at the periphery in front, becoming rounded on the latter portion. Convex beneath. Aperture shaped like that of *T. tosana*, the lip expanded, reflexed below. Alt. 6.4, diam. 9.4–9.8 mm.

Obi, Prov. Hyuga, Kiushiu (Mr. Y. Hirase).

A smaller, less conoidal form than *T. tosana* or *T. dacostæ*, with fewer whorls. It is No. 601 of Mr. Hirase's collection.

Kaliella Austeniana n. sp.

Shell distinctly perforate, turbinate-conic, thin, light reddish brown. Surface very minutely sculptured with densely crowded rib-striæ, which give it a silken luster, and give place on the more glossy base to slight growth-wrinkles and fine spiral striæ. Whorls nearly 6, very convex, the first one sculptured with much more spaced rib-striæ; last whorl obtusely subangular at the periphery, quite convex beneath. Aperture oblique, rather broadly crescent shaped; peristome simple and thin, the columellar margin dilated above. Alt. 2.7, diam. 5.2 mm.

Yaeyama Island (Mr. Y. Hirase, no. 627).

In this species the minute striæ continue below the periphery, and form a silken band around the base, the central two-thirds of which is more glabrous. This has been noticed in *Euconulus*, *Guppya*,

etc., also. The spaced costulation of the initial whorl is a characteristic though not invariable feature of *Kaliella*.

It is named in honor of Lieut.-Col. H. H. Godwin-Austen, whose work on the Indian *Zonitidæ* is destined to become a malacological classic.

Kaliella yaeyamensis n. sp.

Shell narrowly perforate, rather low conic, thin, reddish brown. Surface slightly shining above, glossy beneath, sculptured with rib-striæ comparatively coarse for a *Kaliella* (but still very fine), continuing on the first whorl, obsolete on the base, and excessively minute spiral striæ. Whorls $4\frac{3}{4}$, moderately convex, the last angular (but not acutely so) at the periphery, not very convex beneath. Aperture oblique, broadly crescentic, the lip thin and simple, dilated at the columellar insertion. Alt. 2, diam. 3 mm.

Yaeyama Island (Mr. Y. Hirase, no. 625).

With *K. nahaensis* Gude, this makes three species of *Kaliella* now known from the Loo Choo Islands. *K. nahaensis* has fine, almost subobsolete striæ, and a peripheral keel, thus differing decidedly from the two species described above.

Kaliella ruida n. sp.

Shell perforate, in shape resembling *Microcystina ceratodes* (Gude). Acutely keeled, thin, brown, somewhat translucent, sculptured above and in a band around the base, below the periphery, with sharp, close and regular rib-striæ; the rest of the base glossy, with very minute spirals only. Whorls $3\frac{1}{2}$, moderately convex above, the last quite convex beneath. Aperture wide-crescentic, peristome thin, fragile. Alt. 2, diam. 3.5 mm.

Gojo, Prov. Yamato, Japan (Mr. Y. Hirase, no. 607).

I am disposed to believe this shell, of which but two specimens were sent, is not full grown, and will be found to attain a larger size; but the sculpture is so conspicuous and so unlike any known species of similar shape, that its recognition will be easy.

Georissa luchuana n. sp.

Shell small, globose-turbinate, dull red, composed of nearly $3\frac{1}{2}$ very convex whorls, the first glossy and smooth, with rather large apex, the rest rapidly increasing, closely and regularly striated or lirulate spirally. Last whorl large and obese. Aperture oblique,

half-circular; outer lip simple; columella heavily calloused, wide and somewhat flattened. Length 2.1, diam. 1.85 m.

Yaeyama Island, Loo Choo group (Mr. Y. Hirase, no. 623).

A species relatively much shorter and wider than the related *G. japonica* Pils., which occurs also on Yaeyama.

Dr. v. Möllendorff has recently redescribed *G. japonica* as a new species, not knowing of my earlier description. He used the same specific name (Nachrbl. 1901, p. 45).

Diplommatina insularum n. sp.

Shell minute, imperforate, amber-colored or corneous, cylindric-oblong, the penult whorl widest, those above forming a gradually tapering spire, sculptured with delicate, rather close rib-striæ. Whorls $6\frac{3}{4}$, convex, the last narrower than the preceding, ascending to the aperture, somewhat constricted in front. Aperture circular, the peristome continuous, outer lip doubled; columella acutely toothed; palatal fold short. Length 2.8, diam. 1.4, alt. of aperture with peristome 1 mm.

Yaeyama, Loo Choo Islands (Mr. Y. Hirase, no. 620).

This is a decidedly more tapering species than *D. cassa*. *D. nipponensis* is less slender and smoother, and *D. kobelti* is larger and more pyramidal. All of these are dextral forms. *Paxillus lyratus* Gld. may be closely allied, possibly identical; but the description is not sufficient for critical comparison.

Cyclotus Hirasei n. sp.

Shell broadly and openly umbilicate, subdiscoidal, yellowish-green in color, the first two whorls subtranslucent and deep amber colored; rather glossy, very irregularly and roughly wrinkled or even subplicate, in the direction of growth-lines. Whorls $3\frac{3}{4}$, the first $1\frac{1}{2}$ strongly projecting, teat-like, following whorls tubular, the last whorl slowly descending, barely in contact with, or slightly free from the preceding whorl, at the aperture. Aperture circular, slightly oblique. Peristome circular, unexpanded and acute, continuous. Operculum multispiral, with sunken central nucleus, the edges of the whorls projecting a little. Alt. 4.5, diam. 8.5, diam. of aperture 3.3 mm.

Loo Choo Is. (Mr. Y. Hirase, no 612).

Related to *C. swinhoei* and *C. minutus* H. Ad., of Formosa, but differing in sculpture, the present species being wrinkled but without spiral striation.

Diplommatina cassa n. sp.

Shell dextral, imperforate, oblong, rather thin, reddish amber colored or whitish-corneous, composed of $6\frac{1}{2}$ very convex whorls, the last one narrower, strongly ascending. Surface densely and regularly costulate-striate. Aperture subcircular, the peristome continuous, thin, rather broadly and flatly reflexed, its face concave; there is a sharp, high and narrow crest close behind the outer and basal margins. Subcolumellar tooth strong; palatal fold short, situated to the left of the adjacent margin of the peristome. Length 3.1, diam. of penult. whorl 1.7, length of aperture 1.2 mm.

Kodakari, prov. Hida (no. 604), and Kyoto (no. 452), Y. Hirase.

This species is related to *D. nipponensis* Mlldff., *D. insularum* Pils., and *D. Kobelti* Ehrm. The conical part of the spire is much shorter than in the former of these, judging from specimens from the Hakone Mts., collected by Mr. B. Schmacker.

D. Kobelti is a species slightly longer than *D. cassa*, finely costulate-striate, composed of $7\frac{1}{2}$ whorls, of which only the last two are of equal diameter, those above tapering regularly, forming *a very long conic spire.* The aperture is about as described for *D. cassa.* Length 3.4, diam. 1.6, aperture 1.16 mm. It is thus slightly longer than either *nipponensis* or *cassa*, with one whorl more, and a longer more pyramidal spire. It is from Kashima, prov. Harima, where it occurs with *D. cassa* (no. 305 *b* of Mr. Hirase's collection).

These species are all distinctly smaller than *D. collarifera* S. & B. and *D. tenuiplica* Pils., and larger than *D. uzenensis* Pils.

D. minutissima Mlldff. 1901, is a synomym of *D. pusilla* var. *omiensis* Pils., published eight or nine months previously. Both were based on Mr. Hirase's no. 487.

Tornatellina inexpectata n. sp.

Shell umbilicate, pyramidal, thin, brown, glossy, smooth except for slight growth-lines. Spire straightly conic, the apex obtuse. Whorls $5\frac{3}{4}$, slightly convex, the last rounded at the periphery, convex below. Aperture subovate, armed within with a low entering lamella on the middle of the parietal wall. Peristome thin, the margins remote, columellar margin broadly dilated and reflexed. Length 3, diam. 1.7 mm.

Yaeyama Island (Mr. Y. Hirase, no. 626).

Carychium cymatoplax n. sp.

Shell minute, corneous-whitish, slender, cylindric-fusiform, almost

smooth. Whorls 5, moderately convex, the penult. and last of about equal diameter. Aperture small, somewhat oblique; peristome well expanded, much thickened within, the outer lip broad, with a blunt tooth above the middle, columella truncate at base; parietal lamella strong. Axial lamella becoming a very wide spiral plate within, bent into strong waves. Length 1.84, diam. .64 mm.

Yaeyama Island (Mr. Y. Hirase, no. 618).

This species is smaller and more cylindric than *C. noduliferum*, is smooth, and the internal axial lamella is more strongly waved. *C. noduliferum* was described from Misaki, and has been sent by Mr. Hirase from Nishigo, Prov. Uzen. It is a strongly tapering shell, finely but sharply and regularly striate, and in most adults has a palatal nodule within the outer lip, though this is variable in development. It is larger than *C. cymatoplax*, length 2.2 mm.

NEW PUBLICATIONS.

Digesta Malacologica, No. 1. A Summary of the American Journal of Conchology. By E. R. Sykes.[1] Under the above caption Mr. Sykes proposes to issue a series of digests, prepared after the mod l of those in the Zoölogical Record. "It has been a constant source of difficulty for many years past to ascertain what work has been done by our predecessors, relating either to a special genus or to some faunal district. With the idea of rendering some assistance to students, the present work has been undertaken." The number before us deals with the *American Journal of Conchology*, and commences with a table of dates of publication, followed by a list of titles arranged by authors. The contents of the articles are then referred to under the heads of Anatomy, Distribution, both geographical and geological, etc. The systematic portion is arranged by families, every species described being referred to by volume and page. It is, therefore, easy to ascertain what the series contains relating to the mollusks of any given region, or of any special family or genus, whereas otherwise this information could be obtained only at the expense of much time and labor, or found only by accident. All who have occasion to use the *Journal* should possess themselves of this aid to its use. The Digest is well gotten up, and seems to contain but few mistakes or misprints.

[1] London, William Wesley & Son, 28 Essex St., Strand, 1901. (Price, $1.50; to subscribers to the series, $1.25.)

The Nautilus.

Vol. XV. JULY, 1901. No. 3.

THE AMERICA PHYSÆ.

BY O. A. CRANDALL, SEDALIA, MO.

The members of this genus are the most beautiful shells of all of our fresh-water snails, and, were they properly understood, would be the most sought for by collectors. It has been the custom of authors to attempt to establish species upon slight variations in form until the multiplicity of varieties and synonyms has caused such confusion that even our most experienced conchologists hesitate to venture an opinion as to many of the described species, while amateurs, being unable to obtain satisfactory information upon which to correctly label their "finds," have become so careless about collecting them that they are rarely offered for exchange.

To remedy this evil, and as far as possible to simplify the determination of species, I have given my spare time for several years past to the study of this genus, and now give to the public the result of my observations.

In determining the species of this genus it is not only necessary to observe the characteristic form of the shell, but something of its life-history must also be known. Some species grow to maturity in one season, while others require two or more seasons of growth to mature.

In central Missouri, *P. gyrina* Say is the first to appear in the spring and the last to disappear in the fall. I have seen them crawling on the ice in March and depositing the ova as late as the first of October. They begin depositing eggs early in May and continue throughout the season; and as the young are continually

hatching, all sizes may be found in the fall, none of which will be full grown. The members of this species require more than one year in which to mature, while other species deposit the ova early in May and the young attain full size the same season. Having a knowledge of which species mature—respectively in one, two and three seasons of growth—greatly simplifies the determination of species.

It is unnecessary to watch the growing snail, as I have done, to learn this fact, for every shell carries unmistakable evidence of the number of periods of growth it has required to attain its present size. This evidence is the white and brown lines upon the last, and next to the last whorl, called variceal lines, or bands. At the end of the season, or when the pond dries up, or when from any other cause the shell ceases to grow, the snail strengthens the shell by constructing a triangular-shaped rib within the sub-margin of the lip. In forming this rib the coloring matter which exudes from the mantle of the animal is withheld until the structure is complete, thus leaving a white or light-colored line on the outside of the shell immediately over the rib. Sometimes the line will be shaded with brown or some dark color on one side, rarely on both sides. As the ribs are never removed, the lines always remain visible on the outside of the shell, and mark the periods of growth.

For brevity in describing this feature I may be permitted to coin the word annuan. It is derived from the Latin word *annus*, year, and the suffix *an*, pertaining to, and signifies pertaining to one year, or period of growth.

In examinining shells, first determine whether the example is an annuan, bi-annuan or tri-annuan; then examine the general form and appearance of the shell, the texture, sculpture, the form of the sutures, showing how the whorls are joined together, and the aperture. Color, height of spire, proportionate length of aperture and size of the shell are so variable that they have but little weight in determining species, except in a few cases.

The most reliable characteristics are, in the order here given, texture, structure and sculpture; in fact they are the only ones not changed by environment.

Texture relates to the weight and to the fineness and coarseness of the layers of which the shell is made. The viscid matter secreted by the mantle is deposited on the edge of the shell as the snail grows,

and hardens. In some species the exudation is continuous, or nearly so, while in others it seems to be deposited at intervals. When the deposit is frequent and small, or continuous, the lines of growth will be fine and the surface smooth and shining, as in *P. heterostropha* Say. When made at longer intervals, and large, the lines will be coarse, as in *P. gyrina* Say.

Structure refers to the general plan of the shell, but more particularly to the manner in which the whorls are joined together. In some forms, like *P. ancillaria* Say, the whorls lap over each other like shingles on a roof; in others, like *P. forsheyii* Lea, they rest against each other. This distinction is constant in all species, and to a great extent is carried through the varieties.

Sculpture is the markings on the surface of the shell, and consists of the lines of growth, striæ crossing the lines of growth, as in *P. oleacea* Tryon, ribs, as in *P. costata* Newcomb, and such other markings as may be found constant in a species.

It must be remembered that while these characters are always found in typical members of species having one or more of them, they become modified in the varieties and forms, and the greater the departure from the type the greater will be the modification.

Species are supposed to be founded upon permanent characteristics which are not influenced by change of location or environment. Varietal changes are many and frequent, and it is doubtful if a single variety described forty years ago can now be found living and identified, while species should be found in the habitat of the type with but slight variations in its characterization.

No member of the animal kingdom is so susceptible to local influences as fresh water snails. Every change of environment changes the Physa, and so long as environments continue to change new forms will continue to occur; but they will not necessarily be new species nor varieties, but new forms of the same species, having the same characteristics upon which it was founded, with some of them more or less modified.

Another cause for variations is the probably frequent occurrence of cross breeding, producing hybrids. It is often that forms are presented to conchologists for identification having some of the characteristics of two different species, neither of which is sufficiently strong to control, and the life history not being known, they are described as new species. The forms being hybrids, when the crop disappears

the species disappears with it, and so we have a large list of described species in our literature with but few living forms to represent them.

To simplify the study of the genus I discard all sub-genera and divide the genus into species, varieties and forms.

Species are forms having some characteristics which remain constant for ages.

Varieties are forms having the ruling characteristics of the species to which they belong, with modifications that remain constant for years.

Forms show temporary variations caused by environment or hybridization, and are transient. New forms are appearing every year. I would not attempt to refer all the living forms to their respective progenitors, but leave the collector to attach the label to suit his own taste.

Where a form can now be found that substantially bears the description given forty or fifty years ago, it should be considered a species, if originally founded on sufficient differences from other described species to entitle it to rank as such; but where no specimens of a species has been found since it was described many years ago, it is likely to have been only a local form, and to have become extinct.

Many of the early described species are found now bearing the same distinctive characters as when first described. It is these typical forms that must be our guide, and not the varieties.

The result of my examination of all the described species occurring east of the Rocky Mountains will be found in the following paper.

Physa heterostropha Say.

Synonyms: *P. Philippi* Küster, *P. plicata*, De Kay.

This species was described by Thomas Say in 1817 from forms taken in the Delaware River, and the same forms are found there yet. The water having become polluted, they are covered with a dark coating and many of them distorted. The type is not inflated nor elongated, yet the larger part of the specimens of the species now accepted by conchologists are more or less inflated. Some even go so far as to include under this head all the varieties of *P. ancillaria*, Say, *P. lordi* Baird, and *P. sayii* Tappan. While there are some good reasons for bunching all the American Physæ into one species with a vast number of varieties, I do not believe such a course would be conducive to the best interests of science. Species should be

founded on some distinct and constant characters, and reduced to the minimum.

The shell described by Say is symmetrical, of fine texture, smooth and shining surface, lines of growth scarcely visible even with a lens, whorls four, convex, sutures impressed, spire elevated and acute, and the inner wall of the aperture straight. It is an annuan, rarely taking a second growth, and when it does the growth appears to be an addition to a mature shell.

Distinguished by its symmetrical form, smooth and shining surface, convex whorls, impressed sutures, elevated and acute spire and straight or perpendicular axis, thus forming a straight inner wall to the aperture.

Physa philippi Küster, is an inflated variety bearing all the characteristics of the type, except that it is inflated and the columella is slightly curved. This is the first inflated variety described, and should cover all inflated forms.

Physa plicata DeKay. This form is admitted a species by Tryon, but Binney, Pilsbry, and others, place it amongst the synonyms of this species, where it evidently belongs, unless it is raised to a variety. It being the only elongated form of this species ever described, it may well be considered a variety to which all elongated forms should be referred.

Physa heterostropha alba, n. v. Shell ovate, symmetrical, not inflated, porcelain white, whorls four, convex, sutures impressed, spire elevated and acute, surface smooth and shining, columella slightly curved. Diameter $\frac{2}{3}$ the length. This beautiful little shell was sent to me by Mr. Albert Baily, of Capachet, N. Y., he having taken it from Cedar Lake near that place. It is distinguished by its color.

I have recently seen in Mr. Bryant Walker's collection some very fine forms of this species that seem to be of frequent occurrence in Northern Michigan. They are slightly more elongated than the type, and are marked with a dark-brown apex. This marking does not appear in any of the eastern forms, so far as I know, but it is not sufficient variation to found a variety upon.

Further forms are: *Physa striata* Menke, *P. charpentieri* Küster, *P. fragilis* Mighels, *P. lata* Tryon, *P. primeana* Tryon, and many other slight variations which have not been named.

This species extends from the Potomac and Ohio rivers north and

east over New England and Canada, and as far west as Indiana and Michigan. West of the Alleghanies it gradually gives way to *P. sayii* Tappan. I have never seen a well authenticated example west of the Mississippi or south of the Ohio.

(*To be continued.*)

THE SYNONYMY OF BYTHINELLA OBTUSA LEA.

BY BRYANT WALKER.

This well-known and characteristic little species, which has an extended range through the Northern States from New York to Iowa, if not further west, was first described by Lea, in 1841, as *Paludina obtusa*. Haldeman, in his "Monograph of the Fresh-water Univalve Mollusca" (1844?), although apparently unacquainted with the species, referred it to the genus *Amnicola*. Binney (1862), in his preliminary study of the fresh-water operculates, also placed it among the *Amnicolæ*. Stimpson (1865), in his "Researches upon the Hydrobiinæ," considered it "probably referable" to Bythinella. In this he was followed by Binney (1865) and Tryon (1870), and from that time the species has been uniformly known and cited as *Bythinella obtusa*.

Unfortunately, however, Lea had been anticipated in the use of the name, *Paludina obtusa*, by Troschel, who, in 1837, had described a species of *Vivipara* from Bengal under that name. It follows necessarily, therefore, that Lea's name will have to give way; and had not the species already been described by another author under a different name, a new one would have to be provided for it.

Were it not for the express statement that his species was imperforate, I should be inclined to refer this species to Green's *Paludina alleghaniensis* (see Binney, L. & F. W. Shells, III, p. 60), which has several years' priority. The differences relied upon by Lea in differentiating his "*obtusa*" would scarcely be sufficient in the absence of the other peculiarity. I know of no other species from Pennsylvania that would fill the description except *Amnicola decisa* Hald., which might well be called imperforate. On the other hand,

the "elevated and rather obtuse" spire would apply better to "*obtusa*." In view of this uncertainty, it would seem better to accept a later description, in regard to which there can be no question, rather than to attempt to rehabilitate a name which must always be the object of suspicion. There should be a statute of limitations in science as there is in law; and the use of a name which has become established by tradition and long usage, should not be overturned, in the absence of the type specimens, excepting upon the most convincing proof.

In 1852 Küster, in his "Monograph of Paludina," in the *Conchylien Cabinet*, describes a small species from North America as *Paludina emarginata*, which he attributed to Say, on the authority of Brown. As Say never used the name "*emarginata*" in connection with any fresh-water operculate form, this species will have to stand as *Paludina emarginata* Küster.

Binney, in his "Land and Fresh-water Shells of North America" (1865), refers Küster's species to *Amnicola cincinnatiensis* Anth. as a synonym. This was clearly erroneous, as a most casual inspection of Küster's description and figure quoted by Binney will show.

Tryon makes no mention whatever of Küster's "*emarginata*" in his continuation of Haldeman.

What Küster's species really was has been a matter of speculation with me for many years. Recently, however, in reading Frauenfeld's paper (1863) on the *Amnicolæ*, in the Imperial [Vienna] and Cuming Collections, I found a statement that specimens clearly agreeing with Küster's figure were in the Cuming collection labeled "*obtusa* Whit." Now there was a well-known collector named Whittemore, who lived in Massachusetts in 1840–1860, and it seemed quite probable that he had supplied the Cumingian specimens under Lea's name, but without quoting his authority. Then, too, there was a very evident accord between Küster's figure and his description and those of Lea's species.

On applying to Mr. E. A. Smith, of the British Museum, for information in regard to the Cumingian specimens, I was favored with the following statement:

"The shells marked *Amnicola* '*obtusa* Whit' in the Cuming collection certainly are not *cincinnatiensis* Anth., and I believe that you are right in considering them the same as *obtusa* Lea. They agree exactly with Binney's figure, Part III., p. 70, but are corneous

and not "dark green" as Lea describes it. May not the green tint have been due to confervæ? Accompanying the specimens of '*obtusa* Whit.,' is a ticket '*emarginata* Say,' in Frauenfeld's own handwriting. I do not see how they can be separated from the form described and figured by Küster as '*emarginata*' of Say, or in other words, I consider them the same species."

This would certainly seem to be conclusive as to the identity of Küster's "emarginata" with Lea's "*obtusa*." And, as for the reason above given, Lea's name cannot be used, it follows that the species must hereafter be known as "*emarginata* Küster." As to the proper generic designation, the investigation of the radula by Messrs. Pilsbry and Beecher shows the species to belong to the genus *Cincinnatia*, the dentition being like that of "*Amnicola*" *cincinnatiensis* Anth., and unlike all other known species of "*Bythinella*" or *Amnicola*.

The complete synonymy of our species will then stand as follows:

CINCINNATIA EMARGINATA (KÜST.).

1841. *Paludina obtusa* Lea, Proc. Am. Phil. Soc. II., p. 34, *non* Troschel (1837), Wiegm., Archiv, I., p. 173.

1844. *Paludina obtusa* Lea, Trans. Am. Phil. Soc. IX., p. 13.

1848. *Paludina obtusa* Lea, Obs. Gen. Unio, IV., p. 13.

1844. *Amnicola obtusa* Lea, Hald. Mon. F. W. Univ. Moll., p. 24.

1862. *Amnicola obtusa* Binney Desc. Cat. Amnicola, &c., p. 10.

1865. *Bythinella obtusa* Stimp., Hydrobiinæ, p. 20.

1865. *Bythinella obtusa* Binney, L. & F. W. Shells, N. A. III., p. 69, fig. 138.

1870. *Bythinella obtusa* Tryon, Mon. F. W. Univ. Moll., p. 48, pl. 16, fig. 6.

1852. *Paludina emarginata* Küst., Paludina, Conch. Cab., p. 50, pl. 10, figs. 3 & 4.

1863. *Amnicola emarginata*, Frfld., Verh. Zool.-bot. Ges. Wien. XIII., p. 1030.

1865. *Amnicola cincinnatiensis* Binney L. & F. W. Shells, N. A., p. 85, fig. 169.

A NEW JAMAICAN LAND SHELL.

BY GEORGE H. CLAPP.

Pleurodonte Adamsiana, n. sp. Plate II, Figs. 1, 2.*

Shell imperforate, carinated, depressed, convex above, regularly and very convex below, solid, dark purplish-brown with a white upturned carina; the whole surface, with the exception of the apex, densely, finely granulate; apex subplanulate, almost smooth, shining, yellowish-white; sutures impressed; whorls 5, convex, slowly widening and wavy; body-whorl acutely carinated at the periphery, concave above, convex below the carina, impressed in the umbilical region, very slightly descending anteriorly, with a slight furrow or groove, about 4 mm. long, just back of the aperture above the carina; carina white, translucent. Aperture oblique, subtriangular, shining brown, inside showing the light peripheral band; peristome white shaded with brown, bearing inside the lower margin four teeth; a very small one near the insertion, then a larger on the basal margin, then two near together on a common eminence toward the outer angle of the aperture; the last two teeth are united for over half their height, the outer one turning sharply toward the peristome. The base is deeply tri-scrobiculate behind the peristome, the outer two grooves being in a common pit. Margins of peristome joined by a thin transparent callus which sweeps around the umbilical region.

Greater diameter 32, lesser 28, altitude 14 mm.

"Whitney Estate," Upper Clarendon, Jamaica. A single dead but perfectly fresh and unweathered specimen.

This species seems to unite two widely different groups, as it has the *aperture* and *teeth* of *P. peracutissima* and the granulated surface and supraperipheral furrow of *P. sinuata*. In general appearance it is, however, unlike either.

I take pleasure in naming this shell, one of the most beautiful of the Jamaican *Pleurodontes*, after the late Prof. C. B. Adams who did so much in working out the wonderfully complex molluscan fauna of Jamaica.

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* Plate II will accompany the next issue.

A NEW COLOMBIAN PLEURODONTE.

BY H. A. PILSBRY.

Pleurodonte (Labyrinthus) Clappi, n. sp. Pl. II, figs. 3, 4.

Shell imperforate, thick lens-shaped, carinated at the periphery, strong and solid, chocolate-brown, with a purplish cast; surface slightly striated obliquely, and showing a minute and dense but superficial spiral wrinkling or malleation over part of the base. Spire dome-shaped rather than conic; whorls $4\frac{3}{4}$ to 5, but slightly convex, slowly widening, the first $2\frac{3}{4}$ whorls punctate, the last angular at the periphery, the angle almost obsolete on the more swollen latter part of the whorl, which is very deeply deflexed in front, and strongly constricted behind the lip, the constriction showing two pits behind the basal lip and a linear scar at the periphery. Aperture extremely oblique, ear-shaped, the peristome continuous, the lip broadly reflexed; parietal wall bearing a strong and long oblique lamina; outer lip with a compressed, fold-like tooth rising from a swollen base; basal lip three-toothed, the outer tooth high, oblique and compressed, the median stout and squarish, the inner smaller and bilobed; a small compressed fold stands on the axial reflection, exactly over the umbilicus.

Alt. 21, greater diam. 35, lesser 30 mm.

Alt. 19, greater diam. $32\frac{3}{4}$, lesser 28 mm.

Sierra de Santa Marta, Colombia, at "Alto de Cielo," at about 5,000 feet elevation, in forest among rotting leaves on the ground.

The first specimen taken was a dead shell, eroded and showing a dull red inner layer on the spire, eaten into many small pits on the body-whorl. A second perfect specimen, slightly larger, has been found this year. It is most nearly allied to *Helix sieversi* v. Martens (Conch. Mittheil. iii, p. 7, 1889; Man. Conch. viii, p. 263, ix, pl. 22, f. 7, 8), also from the Santa Marta mountains, resembling it in the arrangement of the teeth, but *P. Clappi* differs from that species in being much larger, with the periphery keeled, the spire lower and dome-shaped, the teeth more strongly developed, and the umbilicus wholly closed. *Pleurodonte sieversi* measures $12\frac{1}{2}$ by $19\frac{1}{2}$ mm., has 5 whorls, a wide-conoidal spire, rounded periphery and minute umbilical chink, and there are some differences in the teeth, the inner

basal one not being described as bifid, and being about equal to the next tooth in size, and no axial tooth is developed.

P. Clappi is a very interesting addition to the sub-genus *Labyrinthus*. It will be interesting to know what snail-eating mollusk or arthropod inhabits the northern part of South America, where this type of shell is developed, that is absent in southern Colombia and Ecuador, where the almost toothless group *Isomeria* occurs.

This species is one of the most interesting of Mr. Herbert H. Smith's finds in the Sierra de Santa Marta. It is named in honor of my friend Geo. H. Clapp.

GENERAL NOTES.

TRUNCATELLA TRUNCATULA (Drap.) IN THE UNITED STATES.—In preparing the Catalogue of North American Land Shells, this species was inadvertently overlooked. It has been recorded by Prof. Verrill, in the Proc. U. S. Nat. Mus., III, 376, and Trans. Conn. Acad. Arts & Sci., V, 525, fig. 8, as follows: "Living in considerable numbers, and of all ages, among the docks at Newport, R. I., July, 1880. It occurred among decaying sea-weed thrown up at high-water mark, both among the vegetable matter and on the under side of stones." "Common on the coast of Europe, and in similar localities. Perhaps introduced on this coast by shipping, but it may have been hitherto overlooked. It was associated with *Assiminea grayana* and *Alexia myosotis*."—C. W. J.

AN EVOLVING ASHMUNELLA.—*Ashmunella thomsoniana cooperæ*, n. var.—Shell with max. diam. from 13 to 15 millim., but usually of the smaller size; basal tooth single, occasionally slightly double; umbilicus narrower than in type or var. *porteræ*, exposing less of the penultimate whorl; genitalia as in *porteræ*, with the same long (22 mm.) spermatheca, and double insertion of the penis retractor. *Hab.*—Las Vegas Hot Springs, 1900, 1901. Discovered by Miss Mary Cooper; later taken in quantity by Miss Cooper and Miss Maud Ellis. The locality is in the Transition Zone, at about 7,000 ft. altitude; *porteræ* belongs to the Canadian Zone, about 1,000 ft. higher. This is not a very distinct form, conchologically; but is worth calling attention to as a species of *Ashmunella* in the making, probably derived from the *porteræ* form rather than from the true *thomsoniana*.—T. D. A. COCKERELL.

PUBLICATIONS RECEIVED.

Maryland Geological Survey: Eocene. By Wm. B. Clark and Geo. C. Martin. It has afforded us a great deal of pleasure and instruction to peruse the carefully prepared and beautifully printed volumes of the Maryland Geological Survey. The State may justly feel proud that it is able to present to the world such admirable reports on its physical and geological features. The present volume on the Eocene fauna is especially interesting to conchologists, as by far the largest number of forms described are molluscan. The volume contains 331 pages and 64 plates, and includes a map and sections. Two formations are recognized, the Nanjemoy and Aquia, the former corresponding in many respects to the Lower Claibornian, and the latter to the Chickasawan of the Gulf States. There are described and well figured 135 species of mollusca; among which is a large new Nautiloid (*Hercoglossa tuomeyi*), while 19 Gastropoda, and 10 Pelecypoda are also described as new. Among the 135 species are 15 of which the genus only is given, the specimens being too imperfect for specific descriptions. We highly commend this step, for the description of indeterminable species is only a hindrance to the progress of paleontology. C. W. J.

CORRESPONDENCE.

Editors Nautilus: I have read with deep interest Mr. J. B. Henderson's article in the June Nautilus on the trip made by himself and companions, Messrs. C. T. Simpson and Robert T. Hill, to Haiti on a hunt for land shells, and was sorry to learn of their comparative failure to secure a greater number of specimens of that splendid species, *Pleurodonte giyantea*. I then recalled that when my friend, Mr. H. Rolle, of Berlin, returned from his Haitian trip, where he had spent three months or more collecting specimens, he called on me at my home (then) at Brooklyn, N. Y., and told me of his efforts to find this snail, and how very difficult it was to secure them, because it was a *night* shell, rarely ever being seen in daylight. He succeeded by doing his searching at night, with the aid of a lantern. He referred to the same spot—palace and fortress—mentioned by Mr. H., where they found the dead shells so numerous. If they had worked the grounds by *lamp light* I fancy they would have been rewarded with a larger catch. My collection contains but one of this species; it is a very large and excellent specimen, except for a somewhat marred epidermis. Mr. H. makes no mention of finding any Cerions. Did they not look or care for them? I think *Cerion* a very interesting and beautiful snail. They must be quite abundant, for the Rev. Mr. Smith, resident missionary at Cape Haitian, sent me a very large number of most perfect and beautiful specimens. I compliment the gentlemen on the final success of their efforts.

June 6th, 1901. A. B. Kendig, *Brookline, Mass.*

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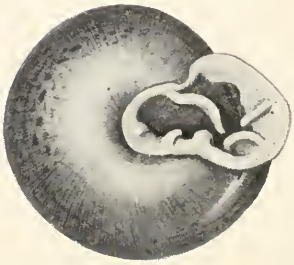

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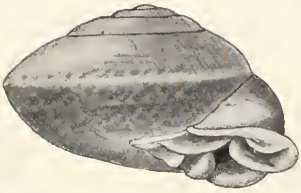

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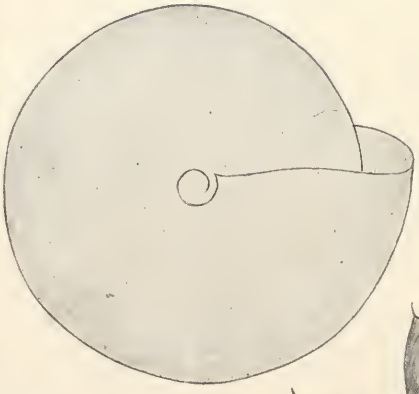

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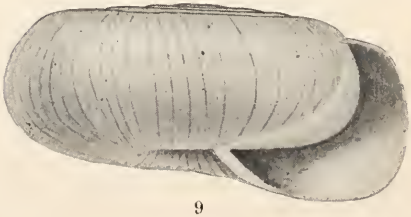

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THE NAUTILUS.

VOL. XV. AUGUST, 1901. No. 4.

PLATE II.

Figs. 1, 2. *Pleurodonte Adamsiana* Clapp. This Journal for July, p. 33.

Figs. 3, 4. *Pleurodonte Clappi* Pilsbry. This Journal for July, p. 34.

Fig. 5. *Physa Walkeri* Crandall. Petosky, Mich.

Figs. 6, 7. *Physa rhomboidea* Crandall. Muddy Creek, Sedalia, Mo.

Figs. 8, 9. *Gastrodonta Clappi* Pils. This Journal XII, p. 86; XIV, p. 58. Large depressed specimen from Clingman Dome, no. 2490, coll G. H. Clapp. Alt. 3, diam. 6.2 mm.

Figs. 10, 11, 12. *Nenia Smithiæ* Pilsbry. Page 39.

THE UNIONIDÆ OF NORTH AMERICA.

BY H. VON IHERING.

By the publication of his "*Synopsis of the Naiades*" Mr. Simpson has rendered an excellent service to students of Malacology and of the *Unionidæ* especially. It is for me the greatest satisfaction to felicitate Mr. Simpson upon having produced a work which will mark a new period in the study of fresh-water mussels.

It will be understood from this that the work of Mr. Simpson does not represent the conclusion of a series of successful studies, but a basis for the beginning of a new period of investigation. Doubtless this work will give an impulse to the study of the *Unionidæ*, and it is the purpose of these lines to point out what we may expect concerning the American *Unionidæ*.

The criticisms we have to make upon the *Synopsis* of Mr. Simpson refer principally to two points: The validity of the genera adopted by him, and the systematic arrangement of these groups to form greater sections. Concerning the specific limits and their sometimes enormous synonymy I am nearly always of the same opinion with him. Some observations about species concerning which I hold divergent views, will follow at more length below. I cannot say the same concerning the genera, as may easily be understood. Many of the distinctive characters are derived from anatomic structures, and therefore are unknown where the animal has not yet been observed. The association of a number of species in one genus is therefore in many cases but a provisional grouping; and specially is this the case with the Mexican and Central American species.

The systematic arrangement of the North American *Unionidæ*, as given by Simpson in his *Synopsis*, is based essentially upon the marsupia; that is to say the gills or parts of them functioning as ovisacs. This is a classification which we may not see employed without scruples, because it is based rather on physiologic than anatomical characters. Zoölogical classification is founded on morphological characters, and while physiologic or biological facts may give us important explanations, they cannot be employed directly for systematic purposes. This is generally acknowledged, since it became necessary to dismember the class of *Helminthes*, and it is likewise valid for the *Mollusca*, as proved by the example of the pelagic gastropods. Whether the eggs expelled out of the genital orifice pass into the inner gills (*Endobranchiæ*) or in the outer ones (*Exobranchiæ*) or if they fill on each side both the gills (*Amphibranchiæ*), is a fact of merely physiologic signification, and cannot be employed for systematic purposes. These differences are less than those which exist in many genera or species of gastropods, very closely allied, in reference to the deposition of eggs, some being oviparous, others ovoviviparous or viviparous. As it seems, there are in many species of the group *Lampsilis* and *Quadrula* structural modifications of the outer gills, which may be used for systematic purposes, but the few exact data thereon which may be found in the publications of Lea, Sterki and Simpson are throughout insufficient. What we need is a careful, histological study upon the gills, marsupia and ovisacs of the North American *Unionidæ*.

These facts, however, do not affect the general question. It is quite evident that a systematic arrangement of the marsupia does not coincide with a natural system of the family. The species of *Diplodon* of New Zealand, which I have examined, had filled only the inner gills with eggs; but Suter has observed that sometimes eggs are also found in the outer gills. Simpson says that in the species of *Quadrula*, both the gills are filled with eggs, but that sometimes the inner gill contains but few. We cannot doubt that in the most ancient *Unionidæ* the eggs were discharged only into the inner gills and that later all four gills were filled with eggs, representing the last stage, the exclusive employment of the outer gills. In the genus *Quadrula* all these successive stages are still represented; and it is not admissible to use such differences for the establishment of genera. It happens that in the same species are observed great differences in this respect. The specimen of *Quadrula heros* Say, examined by Lea, had filled with eggs all the four gills; while the specimen examined by Sterki had only the hinder part of the outer gills filled with eggs, as in many species of *Lampsilis*. According to the classification of Simpson, which in this respect is an artificial one, these specimens would fall in quite different genera. Differences of this nature have caused Simpson to separate from *Quadrula* various species and sub-genera. It is no natural disposition when we see *Pleurobema* allied with *Unio*, *Quadrula tuberculata* Bar. widely separated from the nearly related species *speciosa*, *forsheyi*, etc.; *Obliquaria reflexa* widely remote from *Quadrula metanevra; Quadrula æsopus* allied to *Pleurobema*. In the same manner is *Lampsilis phaseolus* separated from *L. iris*, etc., because the development of the marsupium is more extensive. Therefore it is necessary to associate these separated groups with their real relatives.

(*To be concluded.*)

A NEW COLOMBIAN CLAUSILIA.

BY HENRY A. PILSBRY.

Nenia Smithiæ, n. sp. Pl. II, figs. 10, 11, 12.

Shell cylindric-fusiform, rather thin, lusterless, nearly smooth, obsoletely marked with growth-wrinkles; of a rich purplish-brown color. Whorls $8\frac{1}{2}$, moderately convex, the penultimate widest, those

above gradually tapering to an obtuse apex; last whorl flattening at the sides, elongated, having a weak basal carina, the suture very obliquely descending, becoming shortly free in front. Aperture large, rotund-ovate, dark reddish-brown inside; peristome broadly flaring, white on both face and reverse. Superior lamella vertical, compressed and sharp, continuous with the spiral lamella. Spiral lamella short, penetrating merely to a dorsal position. Inferior lamella rather receding, not extended upon the peristome, strongly converging toward the superior lamella, ascending straightly inside, and penetrating to a ventral position. Subcolumellar lamella completely immersed, short. Principal plica situated high, short, extending from a latero-dorsal position nearly to the lip. Lunella united with the lower end of a short, curved upper palatal plica, together with it forming somewhat the shape of an inverted letter J. No lower palatal plica.

Length 24, diam. 4.2, longest axis of aperture 5.5 mm.

Sierra de Sta. Marta, U. S. of Colombia, at El Libana, at 6000 to 7000 ft. elevation, in moss on tree trunks. Collected by Mr. H. H. Smith, May, 1898.

This species belongs to a somewhat numerous group of plain species from Colombia and Ecuador. It resembles *N. femurina* Jouss., of Ecuador, but has different sculpture and a longer "neck." In *N. crossei* Hid., the aperture is narrower and oblong, not rounded-ovate as in this species.

It is named in honor of Amelia W. Smith, the devoted and capable companion of her naturalist husband, on his collecting journeys through the tropics of two continents. Types in Coll. A. N. S. Phila. and of George H. Clapp.

A GIGANTIC FOSSIL LUCINA.

BY WM. H. DALL.

During the cruises of the U. S. Fish Commission steamer *Albatross* in the West Indies, some years ago, one of the party collected some fossils from various localities, and among others some large internal casts of bivalves from Clairemont, St. Ann's Parish, Jamaica. These, according to the investigations of Hill, must have come from the Montpelier white limestone, a widespread deposit of Upper Eocene or Oligocene age, but older than the Oligocene of the

Bowden horizon. The Montpelier limestone contains, as a rule, little that is recognizable in the way of fossils except foraminifera; hence any species which can be identified is of interest, and in the present case the interest is increased by the unparalleled size, for the genus, of the species concerned. The specimens referred to appear to belong to the sub-genus *Miltha* or *Pseudomiltha* of the *Lucinidæ*. It is absolutely certain that they belong to the genus *Lucina*, *senso lato*, and probably to one or the other of the above-mentioned subgenera. The species, which may be provisionally named *Lucina megameris*, is, so far as I am aware, the largest Lucinoid shell known. It is equivalve, very inequilateral, the beaks being near the anterior third, moderately convex, though somewhat flattened peripherally; the cavity of the beaks rather shallow, the internal margins of the valves smooth and entire, the lower posterior part of the valves produced, the anterior end rounded, short; posterior adductor scars small and high; anterior scar low, narrow and loriform, produced backward nearly to the vertical from the posterior scar. There are no traces of the cardinal teeth, if any, but there were two feeble, non-functional, posterior laterals, one on each valve. The disk is more or less radiately striated and profusely punctate, as in many other Lucinas. The greatest length of the cast, on a line drawn from the umbo tangent to the posterior end of the anterior scar, is 235 mm.; the shorter line at right angles to the last, 230 mm.; the diameter of the cast from side to side, 67 mm. The margins are defective to the extent of half an inch or more in front and behind; the valves appear to have been not quite closed when the matrix filled them, but the margin opposite the umbones appears to be complete. Allowing 15 mm. for the thickness of the shell at the umbones, which from the breadth of the impression of part of the hinge-plate preserved seems reasonable, and the total length of the valves would in that case have been 250 mm., or about ten inches The largest Lucinoid shell heretofore recorded, *Lucina* (*Pseudomiltha*) *gigantea* Deshayes, from the Parisian Eocene, attains a length of 98 mm., slightly less than four inches; from which the overwhelming superiority in size of the Jamaican species is evident.

The cast, without extraneous matter, weighs seven pounds avoirdupois.

With the exception of *Hippopus* and *Tridacna*, the shells of very few, if any, of the teleodont bivalves equal or exceed the above

dimensions, though the mass of the animal in *Panopea* and *Tresus* is probably greater than in our species. On the other hand, among the Prionodonts, such as *Inoceramus*, etc., a number of fossil forms occur which were larger; and the spread of the valves of the recent pearl oyster, *Meleagrina*, sometimes exceeds a foot, when closed.

In a recent examination of all the generic forms supposed to belong to the family *Lucinidæ*, I have been led to the conclusion that there is no evidence that the Palæozoic fossils referred to *Paracyclas* Hall, should be placed in this group. They appear to be absolutely without any of the characters which are diagnostic of Pelecypods belonging to the *Lucinidæ*.

I may add that the Clairemont limestones contain two other species of this family, one a true *Lucina* of the type of *L. edentula* Reeve, and the other a species of *Phacoides* belonging to the subgenus *Lucinoma* Dall., typified by *L. filosa* Stimpson; a group which has a remarkably wide distribution in age, space and depth of water.

THE AMERICA PHYSÆ.

BY O. A. CRANDALL, SEDALIA, MO.

Physa ancillaria Say.

Including the subspecies *Physa vinosa* Gould, *magnalacustris* Walker, and *crassa* Walker.

This species was described in 1826 from forms taken from the Delaware river near Easton, Pa. Typical forms are still found in the same locality. It differs from *P. heterostropha* Say, in its larger size, more inflated form and by its coarser lines of growth. The greatest difference lies in the manner in which the whorls are put together, and the resulting change in the structure of the suture and form of the spire. In that species the whorls lie against each other, forming a more or less impressed suture, while in this form the whorls overlap in such a manner as to make the suture appear as a mere line. The type is shouldered, but in a majority of specimens the shoulder is not prominent. It has a little more than four whorls, the last very large, and the columella is always twisted. It is an annuan, but forms are found having two varicose lines on the last whorl near the margin.

Distinguished by its inflated form, shoulder, low spire, unimpressed sutures and twisted columella.

Physa vinosa Gould. This variety differs from the type only in having a more globose form, the spire a little more elevated, and impressed sutures.

Physa magnalacustris Walker. This form has been recently discovered by Mr. Bryan Walker in northern Michigan. As his description has been published in the NAUTILUS it is not necessary for me to give it here. It is a large, fine globose shell, remarkable for the broad, white longitudinal bands on the last whorl. If they are all like the specimens shown me, it should rank as a species.

Physa crassa Walker. This variety has also been recently described from forms found in Michigan. It is much heavier and somewhat narrower than the type. It has been well described by its author.

Physa ancillaria is distributed over the same territory as *P. heterostropha* Say, but is not so plentiful in the extreme east, and may extend a little further west, but does not cross the Mississippi river. *P. obesa*, De Kay, is a form of this species.

Physa sayi Tappan.

There has been a great deal of contention over this species. Some of our ablest conchologists contend that it should not rank as a species, while others equally as experienced accord it that rank. After having given it much investigation and study, I have decided to recognize it as a species. That it is an offshoot of *P. ancillaria* Say, as that shell is of *P. heterostropha* Say, I have no doubt; but has it not by its constant variation from its ancestor established the right to rank as a species? It is not only possible, but highly probable that all the American species of this genus sprung from one form. The evolution began away back in the dreamy past, and has continued in some degree to the present time. When in our investigations we find a form that has maintained distinctive characters for a long period of time—in fact so long that the knowledge of man runs not to the contrary—we must admit it to specific rank.

It was described sixty years ago from forms taken in Lake Pipin, Portage Co., Ohio, and typical forms are still found having the same inflated form, expanded lip, elevated spire with dark brown apex, five whorls, coarse lines of growth and two varicose bands.

It is distributed over the northern part of the United States, and

extends into Canada and as far west as the Rocky Mountains, but not south of the Ohio and Missouri rivers.

Physa warreniana Lea, is a less inflated form and may be ranked as a variety.

Physa lordi Baird.

This species was described in 1863 from specimens taken in Osoyoos Lake, British Columbia. It is a northwestern species, and probably does not extend east much beyond the Rocky Mountains. It is the largest American species of the genus, and may be readily distinguished by its large size, inflated, gibbous form, and thin and fragile shell.

Physa parkeri Currier.

The consensus of opinion places this shell with *P. lordi* Baird as a variety, but in this opinion I do not concur. I am unable to see any similarity in the two forms except in size, and the general outline of the form when *P. parkeri* is not shouldered. *P. lordi* is a large gibbous form, while *P. parkeri* is large and square shouldered. It is also a thick, heavy shell of a different color and structure. I leave the matter to be determined by those more familiar with these forms than I am.

Distribution, Northern Michigan.

Physa rhomboidea, n. sp. Pl. II, fig. 6, 7.

Shell rhomboid-ovate, large, heavy, robust, yellowish horn-color to pale yellowish-brown, texture fine, surface undulating and shining when not covered with a dark coating, spire elevated, acute with dark brown tip, whorls five convex, sutures much impressed, aperture ovate, lip simple, not expanded, sometimes a little compressed, thickened on inner margin with reddish-brown callus, columella well covered with heavy deposit continuing and extending from the lip. On many of them the columella is folded so as to form a narrow umbilicus.

Length 16 mm. diameter 9 mm. Bi-annuan.

This shell was collected by me in Cedar and Muddy creeks, near Sedalia, Mo. I have since found it at Dardanelles and Sulphur Springs, Ark., and at three localities near Las Vegas, New Mexico. I have sent to Prof. Pilsbry examples from Missouri and Las Vegas. In a reservoir on Romaro ranch I found some dead shells considerably larger than the one described.

It is distinguished by its robust appearance, deep sutures, con-

stricted aperture and umbilicus, which will be found in a large part of them. It is more like *P. solida* Philippi than any other species.

Physa gyrina Say.

Including the subspecies *Physa hildrethiana* Lea, *oleacea* Tryon, and *albofilata* Ancey.

This species was found in Bowyer Creek, near Council Bluffs, Iowa, in 1821. It is a large, coarse shell, sub-cylindrical in form; the largest sizes having six whorls. The lip joins the body whorl at an acute angle, forming a loop-shaped aperture; the penultimate whorl is enlarged, giving the spire a blunt appearance, lines of growth coarse, *crossed by microscopic striæ*, giving the surface a dull appearance.

Diameter $\frac{8}{15}$ the length. This species is a tri-annuan.

Distinguished by its form, coarse lines of growth, loop-shaped aperture, large penultimate whorl and obtuse spire.

Physa hildrethiana Lea, comprises nearly all the forms found east of the Mississippi river. It is distinguished from the type by being of a lighter texture, finer lines of growth, not so much covered with cross striæ, and having a darker color. Many of these forms are more slender.

Physa oleacea Tryon. This variety is more cylindrical than either of the other forms, has a very obtuse spire, lines of growth much finer and the cross striæ more thickly covering the surface, giving the shell a smooth, dull appearance. It is generally found with five whorls. The spire is very variable, but otherwise its markings are constant. Some forms are cylindrical with the spire smoothly rounded over, showing no raised apex. This form Prof. Tryon, in the "Monograph of the Fresh-water Univalve Mollusca," placed with the synonyms of *P. elliptica* Lea. It is sometimes so distinct from all other forms of this species that I should accord it the rank of a species but for the fact that my observations while collecting them have clearly disclosed so many proofs that it is only a peculiar and eccentric form of *P. gyrina*. I have found it inhabiting little ponds, with the typical form maintaining family relations, and of all sizes and forms from the cylindrical scarcely raised spire to the elongated and obtuse spire of the typical form. I am fortified in this position by Prof. Tryon, to whom I took some samples for identification about a year before his death, and he identified them as a variety of *P. gyrina*.

(*To be concluded.*)

GENERAL NOTES.

The following interesting notes are taken from the Journal of Conchology, Vol. x, no. 2, pp. 35–42, April, 1901, "Conchology at the Dawn and Close of the Nineteenth Century" (The Presidential Address delivered by Mr. E. R. Sykes, at the Annual Meeting of the Conchological Society of Great Britain and Ireland, Oct. 27, 1900).

* * * "The close of the Nineteenth Century is, to use a commercial expression, a time to 'take stock,' and consider what progress has been made. It is with one of these forms of estimating our present position that I propose for a few minutes to concern myself, and especially with an endeavor to arrive at some idea of the actual number of species of recent mollusca which are now known to science. Any such estimate can but be approximate, but a survey of the most recent monographs enables one to form a fairly accurate conception.

"The classic starting-point for such a calculation, as indeed for all other systematic molluscan work, is the tenth edition of Linnaeus." His works contain roughly speaking about 700 species. This number gradually increased nearly every year, until "Dillwyn, in 1817, was enabled to enumerate 2,244; which we may divide into: *Cephalopoda*, 45; *Gastropoda*, 1,510; *Scaphopoda*, 15; *Pelecypoda*, 638; *Polyplacophora*, 36.

In the classic work of the brothers Adams (1853–58) we find the following: *Cephalopoda*, 197; *Gastropoda*, 12,604; *Scaphopoda*, 46; *Pelecypoda*, 4,258; *Polyplacophora*, 216.

Treating Paetel's well-known work (1888–1890) in the same way we get: *Cephalopoda*, 305; *Gastropoda*, 35,134; *Scaphopoda*, 137; *Pelecypoda*, 8,467; *Polyplacophora*, 439; or a total of 44,482 species.

"Hoyle's catalogue of the recent *Cephalopoda* in 1886, with addenda in 1896, contains 469. From the Zoölogical Record of 1897–9, we add eleven, and on an average, we may include four for 1900, making a total of 484 species.

In the *Gastropoda* the recent catalogue of the *Cyclophoridæ*, *Cyclostomatidæ*, and allies, by Kobelt and Moellendorff, "yields about 2,444 species, and if we add 48 species from the Zoöl. Record of 1899, and estimate a similar number for the 1900, we get 2,541." Since Paetel's list in 1888 (omitting the *Cyclophoridæ*, etc.), basing 1900 on a three years' average (682), there have been recorded 7,396, a total estimate of 43,021.

As to the *Scaphopods*, the most recent monograph, by Pilsbry and Sharp, yields 238; if we add the single one in the record of 1899, and another for 1900, we have 240 species.

For the *Pelecypoda* we have since Paetel's list (1890), basing as before, 1900 on a three years' average (142), 1,056; a total of 9,523 species.

"Finally we turn to the *Amphineura*. Here from Dr. Pilsbry's work we get: *Polyplacophora*, 540; *Aplacophora*, 33. Adding from the Zoöl. Record in a precisely similar manner we have to include *Polyplacophora*, 59; *Aplacophora*, 4; and we get a final total of 636.

"The next question which arises is, how far are the above totals trustworthy? On the one hand they are inflated by a mass of synonyms which still masquerade as species, while on the other hand they are reduced by a certain number of omissions. The only omission of any importance, however, will, I think, be found in the *Nudibranchiata*, of which the true total is, owing to the nature of the works consulted, unduly curtailed."

"Making a reduction therefore for synonyms and allowing for the above, I think a very fair approximation will be: *Cephalopoda*, 450; *Gastropoda*, 40,000; *Scaphopoda*, 220; *Pelecypoda*, 8,500; *Amphineura*, 600; or a grand total of 49,770—say 50,000 known species of recent mollusca." C. W. J.

THE LOCALITY OF SAY'S TYPE OF ALASMIDONTA MARGINATA.—Bearing on the question whether the name *Alasmidonta marginata* of Say should be applied to an Eastern or a Western shell, and as it has been questioned that Lea ever collected in the Scioto River, the following quotation[1] will be found of interest: "Mr. Lea remembers that Mr. Say founded his genus *Alasmodonta* on a single valve which he himself had picked up on the river shore at Chillicothe, Ohio, and which he carried from that place to Philadelphia in his saddle-bags."

From this it is clear that Say's name should be applied to the form known as *A. truncata* of the western states, as it corroborates Say's statement that the type was found in the Scioto River.

It may be well to point out that the *Journal of the Academy of Natural Sciences of Philadelphia*, containing the description of *Alasmidonta marginata*, although dated December, 1818, really did not appear until the year 1819, which is the same date as the separate of Say's paper from the 3d edition of *Nicholson's Encyclopedia*. From the fact that no locality for the species is given in the latter paper, it seems safe to say that *A. marginata* was first described therein, the locality being supplied in the later paper in the *Journal*, which was published prior to March 13th, 1819, as Say, in a letter of that date, speaks of having sent a copy of it to a correspondent.

In Say's *American Conchology* there is an article, or chapter perhaps, entitled: "An attempt to exhibit a synonymy of the Western North American species of the genera Unio and Alasmodonta," in which will be found listed as a *western species*, "*Alasmodonta marginata* Say."—WILLIAM J. FOX.

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[1] From *The Published Writings of Isaac Lea, LL. D.*, by Newton Pratt Scudder. (*Bull. No.* 23, *W. S. Nat. Mus.*)

CORRESPONDENCE.

We extract the following from a letter recently received from Rev. W. H. Fluck, Wounta Haulover. (Address care of Moravian Mission, Bluefields, Nicaragua):

"I believe I am the only conchologist in Nicaragua, and I suppose my collection is not only the largest but the finest. Caesar said, 'Better be first in a little Iberian village than be second in Rome,' but I don't agree with him. I send you herewith a few shells.

Donax cayennensis Lam. Prinzapolka, Mosquito Coast, Nicaragua, C. A.

Donax denticulatus L. Wounta Haulover.

Nerita pelaronta L. Man of War Keys, Mosquito Coast, Nicaragua, C. A.

Dione dione Linné. Wounta Haulover.

Neritina reclivata Say, var. *reticulata* C. & J. In the Lagoon at Wounta Haulover.

Pachycheilus corvinus Morel. Quiquina, on the Toongla River.

Polymesoda inflata Hanley. Lagoon, Wounta Haulover.

I have eaten bushels of the Donaces. The Indian children collect them at low water."

We would add that the specimens of *Donax* and *Dione* are the finest we have ever seen. The *Neritina* is exceptionally large. *Neritina reclivata* is now referred, correctly no doubt, to *N. lineolata* Lam.; and the netted Central American race will stand as *N. lineolata* var. *reticulata* C. & J. *Polymesoda* is what has usually been known as *Cyrena;* and is now accepted as the generic name for the American Cyrenas, which have a small pallial sinus, such as *carolinensis* and the tropical American species.

Working alone in a bookless land, we are sure that Mr. Fluck will be glad to receive papers on conchological topics, and exchanges for the shells of his region.

GEORGE W. DEAN.

We regret to learn of the death of our old friend Mr. Geo. W. Dean, which occurred on April 10th at his home in Kent, Ohio. Mr. Dean was born in Wayne township, Ashtabula Co., Ohio, August 20, 1820. In 1855 he took up the occupation of a nurseryman and florist, a business in which he was successfully engaged until the time of his death.

Mr. Dean was a great lover and student of nature, and well known to many of the readers of The Nautilus, for notwithstanding his busy life as a horticulturist, he was an ardent and enthusiastic collector of shells.

THE NAUTILUS.

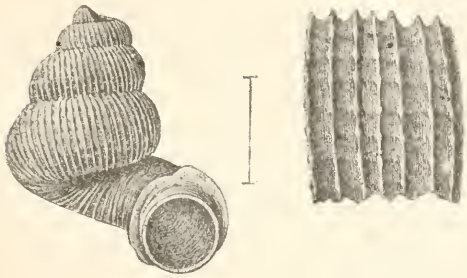
VOL. XV. SEPTEMBER, 1901. No. 5.

A NEW JAMAICAN ADAMSIELLA.

BY J. B. HENDERSON, JR.

Adamsiella jarvisi n. s.

Shell moderately elongate, pyramidal. Whorls four, well rounded, the last leaving the body of the shell and projecting one-half its own length free in a slight curve. Apex truncate; sutures well impressed. Sculpture consists of unevenly-spaced, prominently-raised laminæ circling all the whorls; these are crossed by obsolete spiral liræ which are only apparent at their points of intersection with the transverse ridges. Umbilicus narrow and extending through the shell, forming a puncture at the apical truncation. Aperture exactly round; inner peritreme greatly extended; the outer peritreme corresponding to an exaggerated lamina, circles the whorl like a collar, the outer edge of which is irregular but not fluted. Color pale yellowish-gray.



Height 11; diam. above aperture 6.5; greatest diam. 9; diam. of aperture 3 mm.

This species resembles *A. pearmaniana* in general shape and sculpture, but is obviously distinct by reason of its coarser laminæ and evidences of spiral striæ, also by the striking projection of the last

whorl. The sculpture of this shell is somewhat suggestive of the rough burr-like appearance presented by some of the Jamaican Choanopomas. A series of chestnut-brown spots circling the outer expanded peritreme probably indicates in fresh specimens parallel rows of similar spots upon the whorls. Operculum unknown.

Collected by Mr. Jarvis near Ewarton, Jamaica.

THE UNIONIDÆ OF NORTH AMERICA.

BY H. VON IHERING.

Entering into consideration of particular species, I would make the following observations:

Quadrula spheniopsis Morel certainly does not belong to the genus *Quadrula*, because the female is inflated in the same manner on the base of the shell as *Lampsilis*. I have a good series of specimens, some of which were examined by the late Dr. Fischer. I subordinate this species to the genus *Nephronaias*, of which *Pachynaias* Crosse and Fischer is a synonym.

Quadrula pernodosa Lea. I consider that this is not a variety of *pustulosa*, because the form is quite different from that of the varieties of *pustulosa*, which is always more quadrate, while *pernodosa* is of an elongate, higher form, with more prominent beaks. The hinge-line is longer in *pustulosa*. The distance of the large pseudocardinal tooth from the end of the lateral is more than a half of the height in *pustulosa*, but is less in *pernodosa*.

Lampsilis occidens Lea, I consider as a good species, different from *L. ventricosus* by the more central position of the beaks and different shape of the anterior extremity. I have males and females of both *ventricosus* and *occidens*.

Lampsilis pictus Lea, is perhaps the male of *perdix* Lea.

Lampsilis sapperi sp. n. This is the shell mentioned by Simpson in his Catalogue, p. 571, n. 4, as a doubtful variety of *L. explicatus*. The shell is more elongate, with the ventral margins sinuate and the anterior extremity lower and somewhat obliquely truncate on the inferior part of the anterior margins. The pseudocardinals are very stout, one in the right, two in the left valve. This differs remarkably from *L. explicatus* as figured by Crosse and Fischer, pl. 61, fig. 1, of the Moll. Mex., having the pseudocardinals elevated, compressed,

lamelliform. I believe the *L. sapperi* more allied to *L. umbrosus* Lea than to *explicatus*, being, however, of a more elongate form with produced posterior extremity and larger size. The type example has a length of 64 mm., breadth of 114 mm., diam. of 38 mm. The epidermis is dark brown, blackish, the nacre white. The posterior slope has two obtuse, somewhat indistinct diverging lines. The species is from the Chixoy river in Guatemala, and dedicated to Dr. Carl Sapper, who has collected in scientific expeditions in Central America and Mexico many interesting *Unionidæ*, for which I am much indebted to him.

Nephronaias medellinus Lea seems to be the same as *Lampsilis aztecorum* Phil.

Nephronaias averyi Lea, I have from the Rio Tuca, in N.-W. Guatemala.

Nephronaias goascoranensis Lea (1858), I have received from Dr. Sapper from the Moramusko river, in Honduras, and from the Rio Coco in Nicaragua. The species varies, and I have specimens corresponding to the figure of Lea and others to that of Crosse and Fischer (Miss. Sci., Mexico, pt. 2, 1894, pl. 64, fig. 5 and 5 *a*), of *Unio calamitarum* Morelet (1849.) The name of this widely-distributed Central American species should, therefore, be *Nephronaias calamitarum* Morelet, if Morelet, as also Crosse and Fischer have not confounded two different species, and it is impossible to say what is the true *calamitarum*.

Nephronaias tabascoensis Küster (1856) is also a widely-distributed Central American species. This is my No. 60 from the Rio Copan, Guatemala, tributary of the Motagua river, and which Mr. Simpson believed be the *scamnatus* Morelet. Having both *N. scamnatus* Morel. and *gandlachi* Dunker from Cuba, I consider them different. The true *scamnatus* is a smaller and thinner shell, while to *tabascoensis* are synonymous *U. persulcatus* Lea, *rugulosus* Küst. and perhaps also *plicatulus* Küster. To this species belongs also *Unio calamitarum* Morelet, var. *prolongata* Crosse et Fischer l. c., p. 612, pl. 63, fig. 5 et 5 *a*. The supposed Central American examples of *N. scamnatus* may be identical with *N. dysoni* Lea. *N. tabascoensis* I have also from Nicaragua, Rio Telpanek, and (No. 61) from El Obrage, Guatemala.

Referring to the genera of North American Unionidae admitted by Simpson, I would make the following observations:

Truncilla. This would be a quite natural genus, eliminating some heterogenous elements, that must be placed with *Quadrula*, as *T. personata* Say, allied to *Q. trigona*, and *T. perplexa* and *foliata* allied to *Q. metanevra.*

Lampsilis. A very natural genus, from which, however, *Proptera* should be separated as a genus.

Obovaria belongs in the vicinity of *Quadrula*, as do likewise *Tritogonia*, *Cyprogenia*, *Obliquaria* and *Dromus.*

Ptychobranchus is a subgenus of *Lampsilis.*

Pleurobema will form a natural group after the removal of *P. æsopus* and probably some other species.

Unio. There are to be removed *U. spheniopsis*, a species allied to *Nephronaias cyrenoides*, and also the group of *U. semigranosus*, consisting of species of *Quadrula.* There are a number of species of *Quadrula* in Mexico distinguished by peculiar granular sculpture and thin reddish-gray epidermis, for which Crosse and Fischer created the sub-genus *Psoronaias.* I can find no reason for dividing them between two groups, as Simpson has done; and I unite *U. semigranosus* and allied species to *Quadrula.* In this way all sculptured forms are eliminated from the genus Unio.

Plagiola. Genus probably to be restricted to *P. elegans* and similar forms, while *P. cyrenoides*, etc., may be transferred to *Nephronaias.*

The family *Unionidæ*, as limited by Simpson, would contain, according to these views, two families: *Diplodontidæ* and *Unionidæ*, which are distinguished not only by the marsupia, but also by important conchological characters. The sexual differences, strongly pronounced in the *Lampsilis* group, are not entirely deficient in the other groups, as there are species with pronounced sexual differences in both the genera *Quadrula* and *Diplodon.* The sculpture of the beaks is concentric in the *Unionidæ*, radial in the *Diplodontidæ.* In some species of *Hyria* and *Tetraplodon* the radial sculpture is reduced or almost obsolete. Of two specimens of *Castaliella sulcata* Krauss in my collection, one shows the radial sculpture well developed; in the other it is nearly absent. The pseudo-cardinals are variant in both examples; the nacre is bluish-white. This mussel is doubtless identical with *Tetraplodon schombergianus* Sow., but I have received my specimens, collected by Kapler on the Marowini River, Surinam, from the Zoological Museum in Stuttgart as typical specimens of *Castalia*

sulcata Krauss. As Simpson believes also to be typical his specimen with purplish nacre, further investigations will be necessary, however, as it is probable that the species shows some variability, and that *Tetraplodon schombergianus* is a synonym.

Conformable with the conceptions here exposed, we may consider the super-family of Naiades as composed of two families: *Unionidæ* and *Diplodontidæ*. The former, the only one occurring in North America, may be divided into the following three sub-families:

Unionidæ with the genera: *Anodonta*, *Lastena*, *Gonidea*, *Anodontoides*, *Pegias*, *Arcidens*, *Symphynota*, *Alasmidonta*, *Hemilastena*, *Margaritana*, *Unio*.

Quadrulinæ with the genera: *Quadrula*, *Pleurobema*, *Obovaria*, *Cyprogenia*, *Obliquaria*, *Dromus*.

Lampsilinæ with the genera: *Lampsilis*, *Truncilla*, *Micromya*, *Medionidus*, *Nephronaias*, *Glebula*, *Plagiola*.

As shown by the arguments given, the opinions of Mr. Simpson, in many essential points, are in accordance with those of the writer, and I thought it useful to publish such of my ideas as do not accord with Mr. Simpson's, in order to submit them to examination in the discussion which a book of such great importance will naturally provoke.

S. Paulo (Brazil) 10 May, 1901.

AN ABNORMAL CHITON.

In September of last year Mr. Hemphill sent me a photograph of an abnormal specimen of the common Californian species *Ischnochiton (Maugerella) conspicuus* Cpr., the divergence from the ordinary form consisting in its having *only six valves*. The length of the specimen (photo) is about 70 and the breadth 38 millimeters. There is no indication of pathologic deformity; the proportionate size of the valves compared with the size of the shell as a whole, exhibits no eccentricity. Cooke, in the Mollusca volume of the Cambridge Natural History Series, remarks that "seven-valved monstrosities very rarely occur." Sykes has recently reported and figured a three-valved individual. In the hundreds of Chitons of various species that I have collected on the West Coast I have never detected an example with less than the usual number, though it is possible in handling a large number, especially of the smaller forms, to

overlook an individual varying in the above respect. It will be well for collectors to keep their eyes open for such abnormal individuals; it may be found that they occur oftener than is supposed.

R. E. C. Stearns.

Los Angeles, May 2, 1901.

THE AMERICAN PHYSÆ.

BY O. A. CRANDALL, SEDALIA, MO.

Physa gyrina var. *albofilata* Ancey. This variety is confined to southwest Missouri and northwestern Arkansas, extending into the Indian Territory and Kansas. It is distinguished by its lighter color, fine lines of growth, rarely showing cross striæ, generally malleated on some part of the surface, and large white varicose bands. It is generally found with five whorls.

Forms: *Physa hawni* Lea, *P. cylindrica* Newcomb, *Physa smithsoniana* Lea.

P. gyrina is the most widely distributed of all the American species. It extends over all the territory between the Alleghanies and Rocky Mountains, and from the Arctic region south into Alabama and Texas. I have examples from near Philadelphia, Pa., and from Routt county, Colorado, but I do not consider them permanent inhabitants of those localities. It is possible that they may yet be found to extend as far west as the Sierra Nevada Mountains, but I have been unable to obtain any evidence that they now inhabit the Great Basin. I account for their being found outside of the limits here given by the ova being carried on the feet of migratory birds, by means of which isolated colonies are planted, which survive for a time, but finally become absorbed by the more numerous inhabitants and disappear. They may be called sporadic colonies. This also in part accounts for the hybridization that has produced so many forms that have been described as new species, only to vanish in a season.

Physa elliptica Lea.

Includes the sub-species *Physa elliptica troostiana* Lea, *Physa elliptica minor* n. v.

There probably is not a more distinct species in the genus than this, yet Binney and Haldeman place it in the synonymy of *P. gyrina* Say. Tryon recognized it as a species, gave it a very large

synonymy, and substituted his description of *P. oleacea* for that of Lea. The species are widely different, and were so acknowledged by him in later years. The form which I refer to this species may be described as follows:

Shell elliptical, thin, pellucid, smooth and generally shining, lines of growth scarcely perceptible, spire rather short and obtuse, sutures impressed, aperture elliptical, axis straight, with varicose bands when mature, and diameter from two-fifths to one-half the length. The outline is almost exactly that of an elliptic spring. All the varieties are small, not exceeding a half inch in length.

Physa troostiana Lea is a more robust form, more obtuse, and the diameter a little greater in proportion to the length. Its habitat is along the Ohio valley.

Physa elliptica minor n. v. was sent to me from Grand Rapids, Mich., by Mr. Streng. It is very small, being only four to five mm. in length, rather cylindrical in form, whorls three, convex, sutures impressed, spire slightly elevated, surface highly polished, color deeper than the type. At first I thought they were immature, but the lip has a well defined rib on the submargin, and I now think they are a miniature form of this species.

Physa deformis Currier probably belongs here, and may be a variety, but for the present I prefer to consider it only a form. It may be a larger form of *P. elliptica minor;* if so it will take its place.

Forms: *P. aurea* Lea, *P. febigerii* Lea, *P. nicklinii* Lea.

This species is distributed sparingly over all the region east of the Mississippi and north of Tennessee.

Physa niagarensis Lea.

This species was described in 1864 from forms taken in Niagara river, N. Y., but has generally been considered a variety of *P. integer* Hald. In fact I have held the same opinion until quite recently. In the last few years I have had opportunity to examine examples of *P. integer* from over fifty localities, about one-fourth of which were properly referred to this species, and from these examinations and the places from which they were taken, I feel satisfied that this form is not a variety of *P. integer.* If it is not entitled to rank as a species, it should be referred to *P. heterostropha* as a variety.

They vary but little, but the largest part of those I have examined have the form of *P. heterostropha*, except that the spire is a little

more elevated and the acute apex is tipped with reddish-brown. Axis straight, aperture ovate, smooth and shining surface, rarely showing varicose bands. Color yellowish-white grading into a pale yellowish chestnut in some forms. It usually has four whorls. While white, it is not porcellaneous. Lea's description is correct.

P. saffordi Lea, is a form of this species.

Distribution: Along the Great Lakes.

Physa integer Haldeman.

Subspecies: *Physa integer billingsi* Heron.

This is a very distinct species, described in 1841 from shells found in Indiana. It is distinguished by its oval form, light color frequently banded with white, deeply impressed sutures, ear-shaped aperture and somewhat rough but shining surface. It is not closely allied to any other species. It requires two seasons to reach maturity. Diameter seven-tenths the length.

It is the only species that extends from the Lakes to the Gulf. It inhabits all the country bordering on the Lakes from Ontario west, and extends south and west as far as San Antonio, Texas. I have collected live forms in the latter place, and found it fossil in the post-pliocene at Belton, Texas.

Its distribution being different from that of any other species raises a doubt as to the identity of the species at the extreme ends of the territory covered. It has not been reported from south of the Ohio river, nor from eastern Arkansas, but seems to occupy a belt lying between central Arkansas and central Kansas, continuing about the same width to the Gulf.

Physa billingsi Heron. The type was taken in Rideau river, near Ottawa, Canada. The first examples sent me from that locality varied so much from any described form that I was inclined to accord it specific rank, but having received it from several localities in Michigan, I am now placing it here as a well-marked variety.

It is smaller than *P. integer*, of finer texture, and the sutures are much less impressed. None of them have the ear-shaped aperture. The lip is expanded and in many of them forms the arc of a circle. In some of them the diameter is nearly as great as the length. From this form they graduate into the usual form of *P. integer*.

Its distribution, so far as known, is confined to Canada and Michigan.

Physa anatina Lea.

This is the most striking and beautiful species of the genus. It was discovered in a northern tributary of the Arkansas river in Kansas, in 1864, and in that locality it has its greatest development. The extent of its distribution is unknown. It is plentiful around Wichita, Kansas, and has been reported from Missouri, Arkansas, Nebraska and Michigan. It probably inhabits all the intervening territory.

Distinguished by its sub-fusiform and symmetrical shape, smooth and shining surface, pale color, six oblique whorls, impressed sutures, and the malleations on the lower part of the last whorl of all adult forms. Bi-annuan.

Diameter $\frac{5}{9}$ the length.

Physa brevispira Lea.

Ottawa river, Canada West, furnished the type for this species in 1864. It is not numerous in any locality, and is seldom reported by collectors. I have examples agreeing with Lea's figure from Lake Nippising, Ont.. and shells from five other localities which I believe belong here, although they differ in color and height of spire. Specimens from Detroit river, Reed's Lake and Pent Water, Mich., are good representatives of the species in size, color and all other characters except that the spire is somewhat exserted. The Isle of Mackinac furnishes a much larger white shell which I refer to the same species.

Distinguished by its globose form, opaque whitish color and dilated aperture. It has been sent to me as *P. ancillaria* and *vinosa*. Annuan.

Diameter $\frac{3}{4}$ the length. Aperture $\frac{7}{10}$ the length of shell.

Physa walkeri n. s. Pl. 2, fig. 5.

Shell elongate-ovate, ashy horn color, texture rather coarse, whorls four, very convex, sutures much impressed, spire much elevated and tapering to an acute apex, aperture ovate, not expanded, $\frac{6}{10}$ the length of the shell, lip tortuous and evenly curved, inner margin thickened with thin white deposit. Length 10 mm, width 6 mm.

This little shell was sent to me by Bryant Walker, Esq., of Detroit, Mich., having been collected by him at Petoskey, Mich., after whom I take pleasure in naming it. It has also been sent to me from three other localities in Michigan, and Rideau river, Ont. It is allied to *P. integer* Hald, and fills the place between that species and *P. anatina* Lea.

It differs from *P. integra* Hald. in having a more elevated, slender and acute spire, less deeply impressed sutures and much finer texture. The aperture is nearly ovate, not ear-shaped, the columella gracefully curved and covered with a thin lamina. It differs from *P. anatina* Lea in being much smaller, lighter colored, the whorls less oblique, lines of growth more visible and being of lighter texture. The shell as a whole, when seen with these species, impresses itself as distinct at a glance.

Physa cubensis Pfeiffer.

This is a Cuban species found in Florida. I have not seen Pfeiffer's description, but forms kindly sent to me by Prof. Pilsbry may be described as follows:

Mature shell sub-fusiform, light amber, smooth and shining surface, lines of growth scarcely perceptible, whorls five, convex, sutures impressed, spire rising like a cone to an acute apex, aperture elongate ovate, lip not expanded, columella twisted and covered with a callus. Bi-annuan I think.

A peculiarity of this species, as shown by the forms sent to me, is that the immature form is ovate, the last whorl in the adult being somewhat flattened and elongated, thus making the shell sub-fusiform when mature.

A NEW CALIFORNIAN BITTIUM.

BY W. H. DALL AND PAUL BARTSCH.

Bittium (Elachista) californicum spec. nov.

Shell white, broadly elongate-conic; whorls rounded, falling off more abruptly toward the suture than the summit. The earlier whorls increase less rapidly in diameter, and are more evenly rounded. Base short, well rounded; aperture suboval, effuse and subchannelled anteriorly, with the posterior angle rounded; columella somewhat twisted and slightly revolute.

The ornamentation consists of about 14–16 broad and low axial folds, which gradually become obsolete on the periphery and base,

and on the whorls three or four impressed spiral lines, which are equally apparent on the ribs and intercostal spaces.

This species occurs both recent and fossil in California. Recent shells appear more slender with fewer ribs, 12–14. The type is a fossil specimen from Dead Man's Id. off San Pedro, Cala., and has 8 whorls which measure: long 5.3 mm., diam. 2.2 mm. A recent shell of 10 whorls measured 6.0 mm., diam. 2.1 mm.

LIMNAEA AURICULARIA IN AMERICA.

BY FRANK COLLINS BAKER.

Some weeks ago Mr. Herbert E. Walter, instructor in Biology in the North Division High School, brought me several specimens of a Limnaea which was new to the fauna of the United States. Upon inquiry, the locality was given as the propagating green-house of Lincoln Park. A few years ago Miss Marie LaGrange, a pupil in the North Division High School, found a number of the same species in a lily pond in the park, the water of which was artificially heated to give the necessary warmth for certain tropical plants, the temperature being above 90° Fahr.

Comparison with the shells in the Academy's collection showed the species to be Limnaea auricularia, and an inquiry of the park gardener brought to light the fact that certain plants had been recently imported from Belgium. This information at once removed the mystery surrounding the sudden appearance of this shell in the park, and shows how easy it is at the present time to transport a species from one continent to another, especially if it be a pulmonate. The shells of *L. auricularia* are about an inch in length, of a deep corneous color, and are rather thin. When alive, the mantle of the animal is seen through the shell to be made up of dark and light spots arranged irregularly. The animal appeared rather active, moving about the aquarium with a steady, gliding motion. The heart pulsations were 34 per minute.

It may also be of interest to state that the following introduced species have been found in the greenhouse or in the lily ponds: *Testacella haliotoidea*, *Limax maximus* and *L. flavus*, *Vitrea draparnaldi* and *Limnaea auricularia*.

ORESTES A. CRANDALL.

It is with deep regret that we record the death of Colonel O. A. Crandall, of Sedalia, Missouri, which occurred at West Chester, Pennsylvania, July 6. He left home during the latter part of June on a business and pleasure trip East. After staying a few days at Bridgeport, Connecticut, he went to Philadelphia, where he was sick four days, when he went to the home of an old friend at West Chester, hoping that with complete rest he would soon recuperate; but the extreme heat combined with heart trouble caused his sudden death. Interment was at Sedalia.

"Orestes A. Crandall was born at Syracuse, N. Y., February 25, 1833. In 1835 his parents removed to McHenry county, Illinois, at that time known as the Crystal Lake country, a wilderness inhabited by Indians and wild animals. The nearest settlement was forty miles distant. Thrown upon his own resources at the age of thirteen, Mr. Crandall developed rapidly those sterling qualities which in later years made him prominent among men.

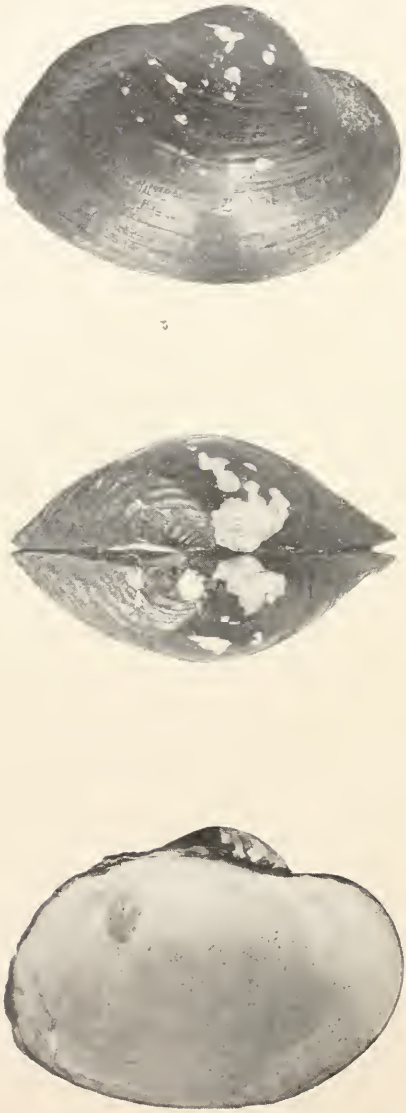
"In 1853 he went to California, walking 500 miles of the distance and carrying his bundle on his back. He worked eight years in the Golden State as miner and mineralogist, returning to "The States" in 1861 and locating in Saline county, Mo.

"At the outbreak of the war, soon after coming to Missouri, he aligned himself with the Union and went to the "wilderness" of Illinois, where he organized and put two regiments of soldiers in the field. He fought with honor during the war, his last battle being the battle of Sedalia, October 15, 1864, in which he was captured by the Confederate forces.

"He located permanently in Sedalia in 1864, and in that year was admitted to the bar and practiced his chosen profession until the beginning of the eighties. He married Miss Kate A. Kidd, of that city.

"In 1875 he organized the Pettis County Bank and was made its president. He was elected president of the Missouri Trust Company in 1880. Under his guidance the company became one of the foremost institutions of its kind in the country."

Mr. Crandall was well known to many readers of THE NAUTILUS, especially those interested in fresh-water snails. For a number of years his spare time was spent in a study of the genus *Physa*, the results of which are still being published under the title "The American Physæ."



Strophitus wrightianus Walker.

THE NAUTILUS.

VOL. XV. OCTOBER, 1901. No. 6.

LAND MOLLUSKS OF THE NORTHEASTERN GROUP OF THE LOO CHOO ISLANDS.

BY HENRY A. PILSBRY.

The exploration of Tane-ga-shima and Yaku-no-shima (Yaku-shima), effected under the direction of Mr. Y. Hirase, gives us absolutely the first information upon the land mollusca of the "northeastern group" of the Loo Choo Islands.

Tane-ga-shima is a well-cultivated island, about 32 miles long and 5 wide. It is comparatively low, the highest point having an elevation of about 1200 feet. It is somewhat noted as being the first Japanese soil trod by an European. In 1542, Mendez Pinto, the Portugese adventurer, landed there, astonishing the natives with his firearms. I have named a diminutive *Clausilia* in memory of this circumstance.

Yaku-shima is a wilder, forested island, nearly circular, with a diameter of about 15 miles. It towers in a splendid mountain mass 6000 feet above the sea. The snail faunas of the two islands seem to be very similar, with a number of identical species. I do not know whether Mr. Hirase's collector ascended the peak of Yaku-shima; probably not. The heights would probably have different species from the shore zone.

A Helicid species, *Eulota* (*Euhadra*) *submandarina*, described by me many years ago from two bleached specimens, one said to be from the "Loo Choo Islands," the other labeled "China," proves to be a characteristic species of these islands. It is quite unlike other known Japanese forms, both in shell and soft anatomy. *Eulota sub-*

mandarina is quite variable. The figured type measures alt. 17, diam. 21 mm. Three specimens from Tane-ga-shima (from no. 660 of Mr. Hirase's collection) measure 16x21½, 18x24½ and 20x26 mm. They are reddish-brown, with a narrow dark band at the periphery. Two others from the same island are more elevated, measuring alt. 22, diam. 21, and alt. 21, diam. 25 mm.; the latter being of a rich dark chestnut color, the band black. These are Mr. Hirase's no. 659.

From Yaku-shima the shells sent out are larger, alt. 23, diam. 30; alt. 22, diam. 28 mm. They have 6½ whorls, like the smaller shells of Tane-ga shima, and the color is rather light, the peripheral band reduced to an indistinct line. This form I have called var. *magna*. It is no. 672 of Mr. Hirase's collection.

Doubtless *E. submandarina* is peculiar to these and perhaps some neighboring islands.

The following species are not confined to the two islands: *Trochomorpha Gouldiana* Pils. occurs on Yaku-shima, indistinguishable from the types from Oshima. *Macrochlamys tanegashimæ* has recently been received from Kago-shima, Satsuma (Mr. Hirase's no. 701), quite like the types, but slightly larger. *Sitala circumcincta* var. *elata* (Gude) is a trifle more brown in color than the types from Hondo, the perforation is perceptibly wider, and the whorls possibly less convex; but specimens received from three localities in Kiusiu are partly similar, partly intermediate in characters, so that although it takes next to no difference to make a "species" in this group, I do not think the Kiusiu or Yaku-shima Sitalas deserve separation from the Nippon form.

Among the land operculates there is a new *Spiropoma* (*Cœlopoma*) which has been called *S. Nakadai*, and a new *Pupinella*, *P. Funatoi*. These are named for Messrs. Nakada and Funato, two able and enthusiastic collectors of shells for Mr. Hirase.

The *Clausiliidæ* are represented by five species and several varieties, all peculiar to the islands, and remarkable for the excessive thickness of the shells. Their general relations are with species of Kiusiu and Nippon, not with those of the central group of the Loo Choo Is. The wonderful forms with plicate lips, found in Oshima and Great Luchu (Okinawa or Nawa Island) are apparently wanting in Tane-ga-shima and Yaku-shima, and their place is taken by species of the sections *Stereophædusa* and *Hemiphædusa*. All but *Clausilia stereoma* are rather small, and all of them are remarkably

unlike any Japanese species, though more nearly related to them than to those of the central Loo Choo Islands.

The general affinities of the faunas of the two islands are with that of southern Kiusiu, but there is remarkable specialization, vastly more than in Tsu-shima, for instance, although the latter is more distant from the west coast of Kiusiu than these islands from the south. Tsu-shima, so far as the specialization of the snail fauna is concerned, might be a part of Kiusiu. Its isolation must be of very recent date, but Tane-ga-shima and Yaku-shima are clearly much more ancient islands. The full list of species sent by Mr. Hirase is as follows:

Species from Tane-ga-shima.

Eulota submandarina (Pils.).
Ganesella tanegashimæ Pils.
Macrochlamys tanegashimæ Pils.
Microcystina Hiraseana Pils.
Clausilia stereoma var. cognata Pils.
Clausilia ptychocyma Pils.
Clausilia entospira Pils.
Clausilia Pinto Pils.
Clausilia tanegashimæ Pils.
Spiropoma Nakadai Pils.
Pupinella rufa var. tanegashimæ. Pils.
Pupinella Funatoi Pils.
Diplommatina tanegashimæ Pils.

Species from Yaku-shima.

Eulota submandarina var. magna Pils.
Trochomorpha Gouldiana Pils.
Sitala circumcincta var. elata (Gude).
Clausilia stereoma Pils.
Clausilia stereoma var. nugax Pils
Clausilia ptychocyma var. yakushimæ Pils.
Ennea Iwakawa var. yakushimæ Pils.
Diplommatina yakushimæ Pils.

Yaku-shima is so for the northern limit for *Trochomorpha*.

There are in all 21 forms. One species is common to Yakushima and Oshima; four are varietal or subspecific modifications of, or identical with, Kiusiu and Nippon species, and twelve species with six varieties are confined, so far as we know, to the two islands.

Most of the species have been described in the Proceedings of the Academy of Natural Sciences, but the following remain to be characterized:

Ganesella tanegashimæ n. sp. Shell imperforate, depressed, with convexly-conoid spire, rather thin. Dead specimens, denuded of the cuticle are white, becoming red-brown above, the inner $3\frac{1}{2}$

whorls of that color; periphery encircled by a narrow red-brown band, the peristome pale red-brown. Whorls $5\frac{1}{2}$, very slowly increasing, moderately convex, the last rounded at the periphery, rather flattened beneath, hardly impressed around the axis, slowly descending in front. Aperture oblique, broadly lunate; peristome narrowly expanded, thickened within, reflexed and abruptly dilated over and closing the umbilicus; columella concave, bearing an inconspicuous, low, oblique, fold-like tooth. Alt. 21–22, diam. 28 mm.

Tane-ga-shima (Mr. Y. Hirase, no. 689).

Only dead and somewhat weathered specimens were found; but what remains of the cuticle on the parietal wall is a moderately bright yellow tint. The species is related to *G. myomphala*, and most resembles the variety *minor* of Gude, from which it differs in the smaller aperture, the columellar tooth, less impressed axial region and higher spire. In this connection I may mention that a species of *Ganesella*, *G. Adelinæ*, n. sp., has been sent from Oshima, Mr. Hirase's no. 352. It is the shape of *G. largillierti* or somewhat more pyramidal, but has a decidedly larger umbilicus than that species. On a pinkish or pale yellow ground there are three blackish bands, the peripheral united with that above, or with a reddish space between, basal band wide, interior of the umbilicus and the dilated columella very dark; peristome well expanded. Alt. $26\frac{1}{2}$, diam. 25, to alt. 24, diam. $22\frac{1}{2}$ mm.

Diplommatina yakushimæ n. sp. Shell similar to *D. cassa* but more acutely tapering above. Whorls $5\frac{3}{4}$, the last two of equal diameter, last half whorl reduced. Sculpture of even, fine, low, rather close, delicate striæ; no spiral striæ. Aperture subcircular, the lip expanded, duplicate; columellar tooth blunt and strong; palatal fold short, above the columella. Length 2.3, diam. 1.3 mm.

Yakushima (Mr. Y. Hirase, no. 679).

D. tanegashimæ is a large shell, conspicuously different in sculpture. *D. yakushimæ* is much smaller than any of the numerous Japanese species of the same group. It resembles *D. cassa* most. Besides its distribution in Hondo, *D. cassa* has now been sent from five localities in the provinces Bungo, Higo and Satsuma, in Kiusiu. It is evidently a species of wide distribution, though surpassed in this respect by the tiny *D. pusilla*, which has been found in Hokkaido, Hondo and Kiusiu, the latter island being represented by specimens of the variety *omiensis* in Mr. Hirase's last sending

Ennea Iwakawa var. *yakushimæ* nov. Similar to *E. Iwakawa* of Nippon and Kiusiu Islands in sculpture and aperture, but of a decidedly broader, more swollen shape. Yakushima (Mr. Y. Hirase, no. 680*b*, types; also 680*a*).

A NEW SPECIES OF STROPHITUS.

BY BRYANT WALKER.

Strophitus wrightianus, n. sp. Plate III.

Shell irregularly subrhomboidal, inflated, scarcely sub-solid, nearly equilateral; beaks very full and high, turned in over a slight lunule; their sculpture consisting of a few strong ridges that run nearly parallel with the growth lines; anterior end rounded, elevated above the line of the hinge superiorly and slightly cut away below; base line evenly curved; posterior ridge angled, ending in a blunt point below the median line of the shell; dorsal slope subtruncate, covered with strong, subconcentric, somewhat broken ridges extending from the posterior ridge to the margin; disk with light uneven growth lines; epidermis almost jet black, lighter on the beaks, shining, with occasional indications of very light transverse sculpture similar to that on the dorsal slope; left valve with an irregular tooth and a vestigeal one in front of it; right valve with a roughened tooth in front of the beaks; laterals almost wanting; beak cavities deep; anterior muscle scars distinct; posterior scars faint; nacre bluish white, a little thicker in front.

Length 54 mm., height 38 mm., width 31½ mm.

A single specimen only of this fine species occurred in two barrels of *Unionidæ* received from Messrs B. F. and G. H. King, collected in the tributaries of the Flint river, Baker county, Ga. It differs from all other known species in the strong ridges which cover the dorsal slope. It seems to be most nearly related to *S. tombigbeensis* Lea, and has the "obtruded anterior margin" characteristic of that species.

Mr. C. T. Simpson, to whom the specimen was submitted for examination, and to whom I am indebted for assistance in preparing the foregoing description, writes in reference to it: "I know of nothing at all like it. In fact it is so different from anything that I have seen or read of that I am at a loss to know just where to place

it. Its general form, texture and color of epidermis inclines me to believe that it is a *Strophitus*, related to *S. tombigbeensis*. I find some vestiges of plication on one or two specimens of *Strophitus* in our collection. The teeth of this are stronger than in any specimen of that genus I have seen, but there is much variation in this matter."

I take great pleasure in naming this species after Mr. B. H. Wright, who has done so much in recent years in developing our knowledge of the *Unionidæ* of the southern states.

NEW PISIDIA.

BY DR. V. STERKI.

The following Pisidia have been known as distinct species for several years, and the names have been used in my own collection as well as in identifying specimens sent for examination by many conchologists. So they should have been published long ago.

Pisidium affine n. sp. Rather large, well-inflated, slightly oblique, beaks somewhat posterior, large and prominent in full-grown, broad and quite low in young specimens, rounded or slightly flattened on top; superior and inferior margins moderately curved, posterior subtruncate, with slightly marked angles above and below, supero-anterior forming one regular curve from the beaks to the anterior end, which is low-situated and well-rounded; surface distinctly and somewhat irregularly striated, with some coarser lines of growth, dull or somewhat shining; color lighter or darker grayish horn to plumbeous or brownish with a few irregular darker zones corresponding with the lines of growth, and often with fine darker mottlings, usually with a broad lighter zone along the margins; the young are pale horn or straw-colored; shell moderately thick, nacre whitish, muscle insertions little; hinge rather stout, plate rather broad; cardinal teeth long, not very strong, the right one curved, its free edge often indented in the middle, its posterior end somewhat thicker, with a fine groove, the left anterior tooth curved, the posterior slightly so, oblique, rather behind the anterior, each covering the other for half their lengths; lateral teeth stout, rather long, their cusps short and somewhat pointed, the outer ones in the right valve of good size; ligament rather long and stout.

Size: Long. 6, alt. 5, diam. 4 mill. (average).

Long. 7, alt. 6, diam. 4.7 mill.

Long. 4.6, alt. 3.8, diam. 2.8 mill. (small, northern form).

Habitat: Great Lake Region, Michigan to New York · also Minnesota, Illinois and Ohio (Ohio river drainage). It seems to prefer quiet water, small lakes and slow-running rivers.

Pisidium affine is related with *nov-eboracense* Pr. and with *sargenti* St. (See the following sp.) From the former, it differs by the following characters: it averages larger, its beaks are larger, broader, as especially noticeable in the young, the whole muscle is more full, the hinge margin is less curved, the supero-anterior, as mentioned, forms one long, unbroken curve, the anterior part is larger, the end situated nearer the "base" and more rounded. *P. nov-eboracense* retains its light, yellowish horn color, and the surface is rather shining, while older specimens of *affine* usually are light to dark grayish, and the surface is more dull.

Our species is somewhat variable. Specimens from Michigan, especially Perch Lake,[1] Reed Lake, some other small lakes, and from the Grand River at Grand Rapids are regarded as typical, and examples from the Little Lakes near Mohawk, N. Y., are rather the same. In northern Michigan, *e. g.*, in Mountain Lake, River Rouge, Carp Lake, there is a smaller form, of darker color but typical shape, collected by Mr. Bryant Walker, and the same was found in Clearwater Lake, Minnesota, by Mr. H. E. Sargent. A somewhat higher form, with a slightly marked angle at the scutellum, is known from Minnesota, Michigan, Buffalo, N. Y. (Miss E. J. Letson), and Meyer's Lake, near Canton, Ohio (the writer). The latter has a straighter striation and a somewhat waxy appearance of the surface.

Whoever has carefully studied and compared a few suites of specimens at all stages of growth, will always recognize the present species, as the young and half-grown are quite characteristic, while some full-grown examples may present similarities with *P. nov-eboracense* and *sargenti*. All these species are decidedly variable, in several directions, and so it takes a good deal of material and some experience in order to ascertain their claims for specific distinction, and to recognize aberrant and poorly developed forms. The present one being a "critical" species, I trust the somewhat lengthy expose on it will be excused.

Pisidium sargenti n. sp. Mussel of medium size, somewhat oblique,

[1] Collected in large numbers by Dr. Kirkland.

well inflated; beaks not much posterior, rounded or slightly flattened on top, well prominent over the hinge margin; the latter slightly curved in the adult, almost straight in the young and half-grown, with projecting, not or hardly rounded angles at the scutum and scutellum, which are slightly to well marked, narrow; posterior margin subtruncate above, passing into the well rounded inferior with an uninterrupted curve, or with a slightly marked, rounded angle, more so in the young; supero-anterior margin little to moderately curved, sloping from the projecting angle at the scutellum to the rounded anterior end; surface regularly and rather coarsely striated, dull, rarely somewhat shining in older specimens; epiconch thin and often worn off, pale horn-colored in the young, lighter to darker grayish to brownish in older specimens, usually with a lighter zone along the margins; shell moderately thick, nacre glassy, colorless to white or bluish, muscle insertions distinct; hinge stout, plate rather broad, cardinal teeth well formed, short, the right one rather strongly curved, its posterior end thickened and grooved, the left anterior angular, stout, the posterior small, oblique; lateral teeth rather short, stout, their cusps short, pointed, the outer ones in the right valve well formed; ligament short, strong.

Size: long. 5, alt. 4.4, diam. 3.4 mill.

Habitat: New York to Ohio, Michigan, Illinois and Minnesota, rather common in creeks, rivers and small lakes.

Well formed specimens are easily recognizad by the oblique shape, the rather short, slightly curved hinge margin with the projecting angles at both ends, the regular striation and the dull, often roughish appearance of the surface; by the latter features it may be discerned from some forms of *P. scutellatum* which are of similar shape; but it is more nearly related to *P. nov-eboracense* and *affine;* and some full-grown, well-inflated specimens, in which the scutar and scutellar angles are sometimes less marked, might be mistaken for one or the other. But a lot of mussels at different stages of growth are always recognizable at once; the projecting angles, especially marked in half-grown specimens, in connection with the peculiarly dull surface (like in "typical" *P. compressum* and in *P. kirklandi*) are well marked characters, and so is the color, which turns to grayish while the mussels are much younger and smaller than in *P. affine.* In the latter species, the hinge-teeth, especially the cardinals, are longer and finer.

The present species is named after Mr. H. E. Sargent, who has assiduously collected small mollusca, and has secured some good lots of this Pisidium.

THE AMERICAN PHYSÆ.

BY O. A. CRANDALL, SEDALIA, MO.

Physa forsheyii Lea.

Sub-species *Physa forsheyii grosvenorii* Lea.

This species was discovered near Ruterville, Texas, in 1864. The description calls for six whorls, but I have examined cotypes in the Academy of Sciences in Philadelphia, and nearly a hundred examples from eight different localities, and have been unable to find a single one having more than five, so I concluded that five is the proper number.

This is a small shell, not exceeding $\frac{5}{8}$ inch in length, and distinguished by its sub-fusiform shape, exserted spire, deeply impressed sutures, smooth but not shining surface. Nearly all the adults are covered with microscopic transverse striæ, which give the surface a dull appearance. Bi-annuan.

Physa grosvenorii Lea, also described in 1864, belongs here as a variety. I have collected it in many different places, and have no hesitancy in referring it to this species. The only difference I can discover between this and *P. forsheyii* is that it is smaller, shorter, a little more inflated, more robust, and of a darker color. Some of the young shells are highly polished, but the adults have the same dull appearance as the species form, and are dark yellowish horn-color. It is a very pretty shell, uniform in size, color and general outline.

In the middle of January I found some of these little shells under some leaves in a spring brook near Sedalia, Mo., where they hibernated for the winter. The aperture, instead of being closed by a film as in land shells, was filled with dirt and sand, mixed with the viscid exudations from the body, forming a cement one-eighth inch thick, which I found quite difficult to remove without injury to the shell.

The species form is distributed over Texas and Louisana, but farther north, through Arkansas, Indian Territory, Southern Kansas and Missouri, as far north as the central part of the state, it takes the form of *P. grosvenorii.*

Forms: *Physa whitei,* Lea.

Physa pomilia Conrad.

This species was first described by Conrad in 1834 from forms taken from Random's Creek, Claiborne Co., Ala., and was again described in 1864 by Lea under the name of *P. showalteri*. They are both the same species, but Lea's description is the most correct, and was substituted by Tryon for that of Conrad. It is exclusively a southern species, its habitat being the country lying south of Kentucky and east of the Mississippi River. An annuan. Very similar forms have been sent to me from Grand Rapids, Mich., as *P. showalteri*, but I feel confident that they are a modified form of *P. anatina* Lea.

Physa microstoma Haldeman.

This species was described from a single specimen found in Kentucky in 1840, and has been reported by Rhodes from several places in that state. Its principal character is the two obtuse teeth on the columella, but the other characters are sufficient to found a species upon. Some time ago I received from Mrs. Geo. Andrews, of Knoxville, Tenn., several lots of shells collected in East Tennessee, a large part of which bear the description of this species except the teeth. It is a thick heavy elliptical shell with four to five whorls not convex, with a continuous peristome, and the labium much thickened anteriorly. The columella is thick and twisted so that it forms a single protuberance somewhat like the tooth-like callus on the columella of *Bulimulus alternatus* Say. The varicose bands are white on the outside and reddish-chestnut on the inside.

I do not hesitate to refer the shells sent to me from Tennessee to this species.

Physa crocata Lea. This is a closely allied form, described in 1864 from specimens taken in Walker Co., Georgia. It is a smaller and much lighter shell. In some specimens the spire is a little more exserted, and the twist in the columella not so marked. In form and color, which is light brownish-ochraceous, they are the same. Both are bi-annuans. Length not exceeding $\frac{1}{2}$ inch.

Habitat: Kentucky, Tennessee, northern Georgia and Alabama.

Physa distorta Haldeman.

Some time ago I received from Mr. H. E. Sargent twenty little shells collected near Woodville, Ala., which I refer to this species. The largest is ten mm. in length and six in diameter; the greatest diameter being near the shoulder. Its color is very light yellowish-gray, whorls three, very convex, sutures very deep. Spire elevated,

first and second whorls small and the last one very large, forming a rounded shoulder; so much larger, that in some of them the spire appears to rise like a cone from an expanded surface. Not umbilicated. Aperture oval, columella scarcely folded, outer lip thickened on sub-margin with a very pale yellowish-red callus. It corresponds with Haldeman's description except the umbilicus.

This species was described in 1842, and so far as I can learn, has not been reported since.

DOUBTFUL SPECIES.

Physa fontana Haldeman, 1841, = young *P. heterostropha* Say.

P. subarata Menke, not sufficiently described for recognition.

P. parva Lea, 1864, probably young *P. anatina* Lea.

P. altonensis Lea, 1864, an abnormal form of *P. gyrina* Say described from a single shell, and not heard of since.

P. inflata Lea described many years ago, and not reported since.

P. solida Philippi. This species was described many years ago from forms found at New Orleans, but I have been unable to procure any information regarding it. It is a very marked species, and it seems that it should have been reported many times. The name is pre-occupied, and should it ever be re-discovered, it will have to be given a new name.

P. tenuissima Lea, 1864. This is a very distinct species if it exists. It was described from a single dead shell found at Alexandria, La. I have been unable to get any information regarding it. I have in my collection a single shell sent to me from Hudson, Ohio, that bears this description, but until others are reported, it had better stand in the doubtful list.

P. globosa Haldeman, 1843. Like the two last, I have been unable to learn anything about this species, except the description given by Binney. It has been suggested that it is the same as *P. brevispira* Lea. I do not concur in this opinion. The form is very much the same, but this is a southern species, and these seldom get as far north as the Great Lakes without materially modifying the form. Besides if it was, it would be found in intervening territory, which does not seem to be the case.

GENERAL NOTES.

LUCAPINA CRENULATA (SOWERBY).—On Aug. 3, at La Jolla, Cal., Miss Vashti Thomas was so fortunate as to find a living specimen of this gigantic keyhole limpet, which she brought to me for examination. As the published descriptions of the animal state it to

be "black," and lack detail, the following notes from life may be useful:

Mantle about 20 cm. long, rather light olive brown, minutely reticulated with black, and blotched in an irregular but radiate manner with dark brown, the blotches mostly around the shell aperture. Edge of mantle black. Shell aperture 43 mm. long, 26 broad. Under side of mantle yellowish-white; tentacles and adjacent parts black; mouth light orange. Foot 65 mm. broad, sole deep orange; sides of foot dark olive brown, edge black, the black grading into the brown. Epipodial ridge darkened, with round white spots, the lower edge crenulated. Upper surface of shell exposed by mantle aperture, flesh colored, with radiating riblets, 13 in 10 mm. measured transversely. Aperture in shell oval, 18 mm. long, 13 broad; portion of animal filling shell-aperture pitch-black. —T. D. A. Cockerell.

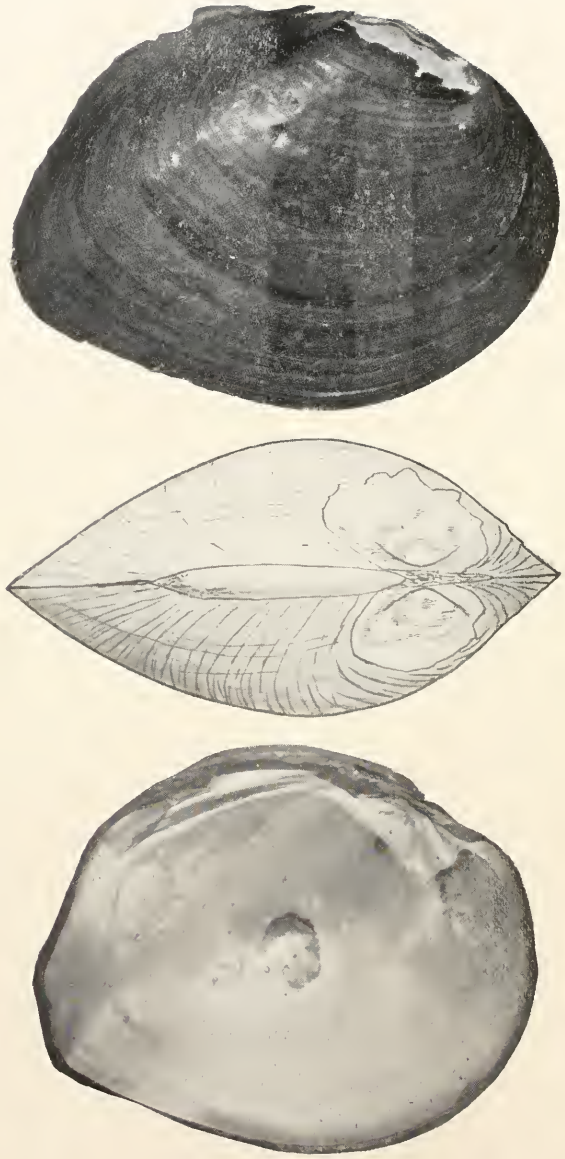
Navanax inermis (Cooper).—During July this interesting animal was not uncommon on mud flats in San Pedro harbor, California. As the published descriptions are somewhat inadequate, the following notes from life are offered:

Dark brown to black, minutely lineolate above with pale yellow lines; anterior margin of head-shield narrowly yellow or orange; in a young example a yellow line, on which are three blue spots, runs back from each lateral angle. Epipodial flaps narrowly margined with orange, next to which is a row of bright blue spots. Beneath the animal is marked with a number of orange streaks or elongated spots, giving way to light yellow lines on the sides. A pink copepod lives in numbers under the epipodial flaps.

The creature is quite variable, and at first I thought there were two species, but with sufficient material all are seen to be specifically identical.

I may as well record *Aglaja purpurea* (Bergh) from San Pedro. Dr. W. R. Coe gave me one which he found on July 20.—T. D. A. Cockerell.

Epiphragmophora Kelletii, on Santa Catalina Island.—"We found the first ones at the Canyon back of Avelon, where we found the *E. gabbi*. In this locality there are only scattering shells and we were greatly disappointed. But we made a trip to the Isthmus and there we found them in quantities. They live on and under the cactus, and I have found them nowhere else. This is their hybernating season of course, and they are all asleep. Sometimes a dozen on one leaf, old and young. I expected to find them on the fresh growing cactus leaves, but instead of that they are on the old dead leaves, and under piles of dead leaves. They do not seem to require moisture. I think we have found as fine specimens as are to be found anywhere.—Mrs. E. M. Gaylord, July 19, 1901.



Quadrula lananensis Frierson.

The Nautilus.

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A NEW LAND OPERCULATE FROM HAITI.

C. T. SIMPSON AND J. B. HENDERSON, JR.

Ceratodiscus, nov. gen.

Shell almost strictly discoidal; spire very slightly raised; whorls few, nearly round, closely coiled except the last third of the outer one, which leaves the penultimate whorl at a tangent and has a groove on its inner side; aperture nearly circular, scarcely thickened or reflexed; surface with finely reticulated sculpture; epidermis corneous. Operculum unknown. Probably one of the Cyclotidæ.

Ceratodiscus solutus, n. sp. Pl. V, figs. 1, 2.

Shell small, planorboid, the large nucleus slightly raised, but not elevated to the level of the last whorl; whorls three, nearly round, being a little wider and flatter above than below, the first two and two-thirds in contact and having a deep suture above and below, the last third of the outer whorl solute, leaving the penultimate whorl at a tangent, the free part very slightly deflexed; on the inner side of the uncoiled part of the shell, close to the penultimate whorl, there is generally a well-marked groove; surface with close, delicate incremental striæ which are crossed by microscopic threads that run parallel with the direction of the whorls; aperture nearly circular, compressed a little on the inner side; peristome scarcely thickened or reflexed; epidermis greenish-yellow. Height 1.5, greatest diameter 5, diameter at the point where the last whorl becomes free 4 mm.

Seven dead specimens were found on the mountain of La Ferriere, in northern Haiti, at an elevation of perhaps two thousand feet, in a

talus of red clay by the road side. These were the result of an hour's search, and it is greatly to be regretted that no specimens were found with the operculum. When taken they were considerably incrusted with earthy matter.

A TEXAS OIL WELL FOSSIL.

BY T. H. ALDRICH.

Some months since, Dr. Wm. B. Phillips, Director of the Texas Mineral Survey, sent me a few fossils from Beaumont, Texas, obtained at a depth of 390 feet in an oil well on Spindle Top Hill. Among them was a new species of *Nassa*, which has been described in Bulletin No. 1 of the University of Texas, Mineral Survey, July, 1901. Description is herewith repeated, and a figure added.

NASSA BEAUMONTENSIS Aldr.

"Shell cancellated, whorls seven, the first two smooth, the others with two strongly nodular transverse lines, except the body whorl, which has six or seven. Aperture with both outer and inner lip dentate, canal short. Length 8 mm., breadth 4 mm. This species resembles *Nassa bidentata* Emmons, but is much more strongly nodular and has but two transverse or spiral ribs, and also possesses one more whorl. The shell resembles a species of *Phos*, externally."

DESCRIPTION OF A NEW UNIO FROM MISSOURI.

BY WM. A. MARSH, ALEDO, MERCER CO., ILLINOIS.

Pleurobema missouriensis, new species.

Shell smooth, obliquely triangular, rounded before, subbiangular behind, moderately thick, very much thicker anteriorly, sides somewhat flattened, beaks wide, solid, incurved, ligament long, light brown, epidermis light brown, without rays, growth lines numerous, not raised, umbonal slope wide and rather flat, posterior slope wide,

flattened, with two dark inconspicuous lines running from beaks to posterior margin, beak sculpture unknown; cardinal teeth rather long and solid, depressed, disposed to be double in both valves, corrugate. Lateral teeth straight, oblique, corrugate. Anterior cicatrices distinct, deep. Posterior cicatrices distinct and well impressed, shell cavity wide and deep, nacre white.

Habitat, near Poplar Bluff, Black River, Butler Co., Missouri.

I know of no described species which this closely resembles; in outline it is perhaps nearest to U. Bigbyensis, Lea, but differs in every other respect. Specimens of Bigbyensis from Flint River, Ala., attain twice the size of this shell. Bigbyensis is nearly always covered with green rays. This shell is rayless. It also has higher and more massive beaks, is more equilateral and differs entirely in the color of epidermis, teeth, etc. The color of the epidermis and character of the beaks is more like U. Hartmanianus, Lea, but that shell has very much higher beaks, more swollen and pointed, and is in every respect a more solid shell.

Four specimens of this shell from quite young to adult have been in my collection for a number of years, having been collected by the late Ellwood Pleas, of Ind. I never could place them with any known species, but have kept them separate, hoping that sooner or later I might obtain others like them, but having failed to obtain others, I now describe them.

A NEW UNIO FROM TEXAS.

BY L. S. FRIERSON.

Quadrula lananensis, n. sp. Plate IV.

Shell quadrate to triangular, nearly equilateral, anterior margin rounded. Base round in front, nearly straight behind. Posterior oblique, biangular, slightly emarginate. Dorsum curved, smooth, nearly polished above, striate below and upon posterior slope. Lines of growth distinct and ill-defined. Dark reddish-brown, sometimes a little olive, obscurely radiate. Beaks eroded, umbos low, somewhat inflated. Anterior umbonal slope rounded. Lateral slope flattened. Posterior ridge angular near the beaks, becoming obsolete near the base. Ligament brown, smooth, medium-sized.

Length 3.2, height 2.3, diameter 1.5 inches.

Shell of medium thickness, thinner behind. Teeth double in left valve, single in right. Laterals rather thin, nearly straight. Cardinals stumpy. Muscle scars well marked; generally separate, sometimes confluent. Pallial line distinct in front, less so behind. Cavity of shell dish-like; of the beaks deep and full.

Sometimes the dorsal muscle scars are situated in the extreme end of the beak cavity, but generally upon the base of cardinal and dorsal plate. Nacre rose-color, with blotches of yellow surrounded by brown. Cavity nearly always studded with numerous pearly excrescences.

Flesh of animal whitish or salmon-colored exteriorly, but shows scarlet when cut. Eggs carried in all four gills, very red, and the gravid animal thus presents a striking appearance.

Habitat: Lanana and Banita Creeks, near Nacogdoches, Texas. About 200 specimens were taken on July 10, 1901, by Messrs. Askew, Strode and Frierson.

Examples may be seen in their cabinets, and in the U. S. National Museum and Academy of Natural Sciences, where the types are deposited.

Q. lananensis is closely allied to *Q. askewii* Marsh, both by its conchological and anatomical characteristics. It may be differentiated from that shell by being longer, more compressed, more oblique, and its shell is never so *inflated and thickened in front as Askewii*, and not so acutely angled on the posterior ridge.

Internally, *lananensis* is rose-colored nearly invariably, and the color is *uniformly spread over its surface*. *Askewii* is mostly white, and when colored (pink), the color is almost always confined *exterior to the pallial line*.

Finally, *Q. Askewii* never possesses those peculiar pearly excrescences which seem to belong to *lananensis*. This species was collected many years ago at the type locality by Mr. H. G. Askew. But that gentlemen's innate modesty forbade his describing the shell, and he generously gave to me this honor.

Lananensis is the shell quoted as having been found by Mr. Askew in the Lanana Creek, in the "Contributions to the Natural History of Texas" (page 321), by Mr. J. A. Singley, and called by him *U. cerinus* Conrad. Its relationship to this abundant Louisiana shell is so remote, however, that it is not worth while to point out their differences.

ON THE CLASSIFICATION OF THE UNIONIDAE.

BY CHAS. T. SIMPSON.

In the August and September numbers of the Nautilus, Dr. von Ihering takes exception to the classification of the Unionidæ proposed by me in the Synopsis, claiming that it is based essentially on the marsupia.

He has apparently overlooked the fact that it is founded not merely on the characters of the marsupia, but on the more obvious anatomical characters, as well as those of the shell and the beaks. It agrees with what I believe to be the development of the family from the earliest and simplest forms to the latest and most highly organized.

So far as the classification of the Diplodontinæ is concerned we essentially agree. This I divided into two supergeneric groups founded on characters of the beak sculpture and shell, and *not* on those of the marsupia. Von Ihering agrees with me that the earliest uniones probably had radial beak sculpture. I have examined the animals of a large number of the South American and Australasian uniones and in all cases where they were gravid the embryos filled the inner gills alone, forming a smooth pad, the ovisacs not being separated by sulci. I have examined a few specimens of the forms with zigzag radial beak sculpture (Rosanoramphus), and found in the gravid ones that the marsupia filled the inner gills only. It may be, and probably is the case, that in rare instances among the Hyrianæ there are a few embryos in the outer gills. I know of no special characters employed in the classification of large groups which do not vary somewhat, but I believe it still to be a fact that in the Hyrianæ the embryos are almost invariably contained in the inner gills only, that in the Unioninæ they are found in the outer, or (in the Tetragenæ) all four of the gills.

In the South American and Australasian Uniones we have the radial beak sculpture with simple shells and the embryos contained within the inner gills, the ovisacs not being separated by any external markings. I believe that these are the simplest and lowest forms of Unione life, that they have descended almost unchanged from the earliest forms of the family. The fact that they occupy the Southern Hemisphere exclusively while the Unioninæ, containing

the more highly developed forms, belong entirely in the Northern Hemisphere, would indicate this. I consider the radial beak sculpture a character belonging to the older and simpler forms; the concentric beak sculpture belongs to the more recent and higher forms. The zigzag radial sculpture of the group Rosanoramphus is a move in the direction of concentric sculpture, hence of a higher order than that which is strictly radial.

The Tetragenæ is a transition group. *Its young are contained in all four of its gills, filling them throughout*, though they are more numerous as a rule in the outer than in the inner, and this fact together with the general character of the shells and the beak sculpture, which is generally more nearly concentric than radial, led me to place these forms in the Unioninæ rather than to make a separate sub-family for them. *In every case where I have placed a form in this group the shell has deep beak cavites.* In the genus *Pleurobema*, which seems to be the next step in the way of development, while the shells are generally rather short, solid and inflated as in Quadrula, *the beak cavities are invariably shallow*, and in all cases that I have examined *the outer gills only contain embryos.* Here we have characters of the marsupia agreeing with those of the shells. Care must be taken in the examination of the marsupia or appearances may lead to wrong conclusions. According to von Ihering, Sterki has found *Quadrula heros* with only the hinder part of the outer gills filled with embryos. I have seen the same thing in other Quadrulas. I have seen in some of the Unionidæ the front part of the gills filled with embryos while all the rest was empty, and in a number of cases a few ovisacs in the middle or in various parts of the gills entirely empty, while the rest were full, or a few filled while all the rest were empty. In such cases the empty ones had simply been discharged, the full ones had not. In all the forms which I have mentioned so far the marsupia fill the entire gills and are pad-like, that is, the ovisacs are not marked out separately by sulci.

Advancing a little in the development of the family we find a number of aberrant forms confined to the Mississippi and Gulf drainages of the United States. Each group has certain characters of the shells which we may call generic, though they are not striking. But they are all very wonderful in the character of their marsupia. In such groups as *Ptychobranchus*, *Cyprogenia* and *Strophitus*, the marsupia are astonishing, and in all of them the ovasacs are distinctly marked.

To this point, proceeding upward in the scale of development, the shells of males and females are essentially alike. It is true that there is some variation in their forms, but it is equally true that somewhat elongated specimens with no inflation at the post-basal part of the shell may be females, while shorter specimens that are full post-basally may be males. I do not think there is any strict dimorphism up to this point. In many cases among these lower forms I have assorted my material before opening it, placing in one lot those I would naturally suppose were males, and in another the presumed females, and on opening the shells and examining the animals I always found I was as likely to be wrong as right. In some groups, notably *Nodularia* and *Lamellidens*, all the shells of certain species are inflated at the post-basal region.

Above this point the shells begin to be regularly dimorphic. They are less regularly so in *Obovaria*, *Medionidus*, some forms of *Nephronaias* and *Plagiola;* they are nearly always dimorphic in *Lampsilis* and *Truncilla*. The shells of male and female are always so different that the merest tyro could without difficulty separate them.

Von Ihering believes that the *Unio tuberculatus* of Barnes is nearly related to the *U. forsheyi* and *U. speciosus* of Lea. I am surprised at such an opinion, because, while the shells of the two last-mentioned forms are alike in male and female, those of the former are strictly and remarkably dimorphic, that of the female being more compressed and ending posteriorly in a wide, rounded wing. That of the male is more inflated, is truncate behind, and has no wing at all. In the animal of the female there is a wide, rounded flap of the mantle which fills this peculiar extension of the shell, differing somewhat from that of any other that I know of.

Now among all these higher forms comprised in the group *Heterogenæ* there is a radical difference in the marsupia. Wherever I have been able to examine them, *they occupy only the posterior portion of the outer gills in the form of distinctly-marked ovisacs*. Each ovisac when filled is rounded below. *The higher the form ranks, the more markedly is the marsupium swollen and separated from the rest of the gill, and the more distinctly is the female shell swollen in the post basal region to correspond with it.* In some forms of *Plagiola* and *Medionidus* there is little difference between male and female shells. In such cases the marsupium, though having the characteristic ovisacs, is but

slightly fuller than the rest of the gill. In the more highly organized species of *Lampsilis*, both the shell of the female and the marsupia are decidedly produced behind. In *Truncilla*, which I regard as the highest manifestation of Unione life, the marsupium is almost absolutely separated from the rest of the gill, and when full, assumes the shape of a great kidney, projecting below the rest of the branchiæ. The great flap of the mantle of the female is very peculiar, being double or having a strong over-hanging ridge inside. In many of the shells of this genus the area corresponding with and covering the marsupium is greatly swollen, is thin, has a different texture from the remainder, is gaping and distinctly toothed.

I have never been able to examine a gravid female of the *Unio tuberculatus* of Barnes, hence I cannot give anything more than a guess as to the character of its marsupium, though from some material lately seen, in which the ovisacs appeared to have just been emptied, I am inclined to believe that the outer gills are filled throughout with embryos, forming well-marked ovisacs.

Now these remarkable characters of a distinctly separated marsupium occupying only the hinder part of the outer gills, and a corresponding swelling of the female shell to receive it, the fact that the more distinct and swollen the marsupium is the more pronounced is the swelling of the shell, may be merely the work of chance; they may stand for nothing whatever in the way of rank or development among our Uniones, but it does not seem so to me. All the changes of shell and marsupium which I have indicated seem to me to be steps in the development of the family from the lowest, simplest and oldest forms to the highest, most complex and most recent.

I need not occupy space with a discussion on the validity or proper determination of species. Such questions are after all largely matters of personal judgment, and in this branch of the work I have endeavored to do the best I possibly could with the material I have been permitted to examine.

Dr. von Ihering changes the subfamilies Unioninæ and Diplodontinæ into families, and divides the former into three sub-families, Unionidæ, Quadrulinæ and Lampsilinæ. He gives no characters for these sub-families, and I am totally at a loss to know on what he would found them. Certainly he cannot establish them on beak sculpture, for in nearly all the species this is more or less concentric, and it seems to me does not offer distinctions sufficiently important to be used as a basis for founding sub-families.

This classification is not founded on characters of the marsupia, for he has placed in Quadrulinæ groups in which the embryos occupy all four of the gills, others in which they fill only the outer gills, and still others where they are confined to the hinder or the median part of the outer gills. Besides, he distinctly states on page 39 that a systematic arrangement of the marsupia does not coincide with a natural arrangement of the family.

Nor do I see how such an arrangement can be based on shell characters. *Obovaria*, which is placed with *Quadrula*, has more or less perfectly developed dimorphism in the shells. In *O. ellipsis* the female shells are almost always swollen at the posterior base, and the same is the case with *O. lens* and *O. circulus*, while in *O. castaneus* the male and female shells are as distinct as in any species of *Lampsilis*. *Ptychobranchus*, with its wonderfully folded marsupium occupying the entire outer gills, with the shells of male and female alike, he places in the genus *Lampsilis*. Why he does so I do not know, as the group differs most decidedly from *Lampsilis* in the characters of shell, marsupium and animal.

On the other hand, he places *Truncilla personata* Say, *T. perplexa* Lea, and *T. foliata* Hild., in the genus *Quadrula!* To me such an arrangement is absolutely astonishing! The male shell of the first-named species is somewhat triangular, and does resemble a *Quadrula* somewhat. The female shell is very different, being quadrate and having a decided, gaping, toothed post-basal swelling. In *T. perplexa* the female shell has a great rounded post-basal swelling, which differs in thickness, texture and color from the rest of the shell. I do not think there is a species known in which the differences between the male and female shells are so great as they are in *T. foliata*. In the male shell at the place where there is a compressed, radial, central area the outline of the female is carried down into an enormous and elongated, rounded wing. That these should belong in a genus in which the shells of male and female are alike and from which the animal and marsupium so widely differ, is beyond my comprehension! If such an arrangement is a natural one then I am sure that all the years I have spent in patiently and lovingly studying the Naiades have been absolutely wasted. It seems to me that we might just as well go back to the arrangement temporarily adopted by Dr. Lea, of grouping together in one lot those forms which have a wing, and in another those which have none, and subdividing these groups into small ones founded on form and sculpture of the shell.

I have no doubt that a careful histological study of the branchiæ and perhaps other parts of the animals of the Unionidæ will furnish additional characters for classification. But it will be many years before this can be done, and when it is, I feel sure that the results of such study will fully agree with the characters of the shells and marsupia.

HOW POTAMIDES (CERETHIDEA) CALIFORNICA HALD. TRAVELS.

BY MRS. M. BURTON WILLIAMSON.

In traveling over the mud-flats, *Cerethidea californica* Hald. leaves zigzag marks upon the sandy mud. These lines are made by the apical whorls of the shell as it is dragged forward, or sideways. How does the animal crawl? It *appears* to move forward by the contraction of the foot only, but my observations have led me to the conclusion that the foot movement is somewhat secondary. The movement of this tapering shell is one requiring considerable muscular strength. This is very apparent. In order to study the mode of travel of this species, a specimen was studied as it traveled up the sides of a glass jar of sea-water, and this and other specimens were studied for several hours. The conclusion reached was, that first there was a strong muscular movement forward, then the foot advanced. The Cerethidea pushes its head forward while the tentacles are expanded to their full extent, the body whorl is raised with an effort, then the shell is propelled *forward before the foot advances.* Immediately, no time is lost, the foot is spread out its full capacity and drawn forward. This is immediately followed by a contraction of the foot in the posterior part, then the head is again advanced. The strength of the animal seems to be concentrated in the movement of the body-whorl as it is raised up and forward. Of course all these movements are rapid, so that it requires close observation to see that all movements are not simultaneous, or at least which is secondary. A homely illustration may be used to make this movement plainer. When a man attempts to step upon a ladder with a hod full of bricks, or plaster, his first movement is apt to be a hunching of the shoulders—the weight being

here—then the step forward, or upward, follows. The movement of the body-whorl reminded me of this hunching of the shoulders of workmen when extra weight was to be borne by them.

GENERAL NOTES.

Goniobasis in Massachusetts.—A few years ago the Rev. Geo. D. Reid found *Goniobasis virginica* at Deep River, Connecticut. That was, I think, the first instance of that species being found in New England. On October 1st, while riding the wheel from Springfield to Hartford, I examined the Connecticut River for a few minutes and found the same species in the town of Agawam, Mass., at a spot some three miles from Springfield. This establishes the species in Massachusetts, and no doubt it will be found farther north in the same river.—Henry W. Winkley, Branford, Conn.

Truncatella on Guadalupe Island.—Specimens of this genus were collected by Mr. R. E. Snodgrass, in November, 1899, for the first time on any of the islands off Lower California. They resemble *T. stimpsoni* Stearns, but differ in being stouter with less convex whorls, and of a pale red color. Length 6, diam. $2\frac{1}{2}$ mm. This form may be called *T. stimpsoni guadalupensis*.—H. A. Pilsbry.

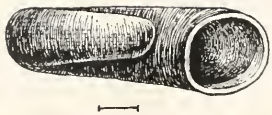
Cypræa citrina Gray.—Any one interested in the geographical distribution of Cypræidæ will be pleased to learn that the true *Cypræa citrina* Gray, has been rediscovered on the beach at Fort Dauphin, S. Madagascar. The old authors have recorded the species from Madagascar, but some more recent ones gave Australian localities as the habitat of this scarce cowry, and supposed there was some error about the existence of the species on the shores of Madagascar. As there may be no doubt whatever about this and about the identification of the specimens, *Cypræa citrina* must really belong to the fauna of Australia as well as to the fauna of Madagascar. It somewhat recalls the far more common *C. helvola*, but the teeth are totally different. The color itself, although similar, is not quite the same.—C. F. Ancey.

PUBLICATIONS RECEIVED.

CATALOGUE OF THE MARINE INVERTEBRATES OF EASTERN CANADA. By J. F. WHITEAVES, Geol. Survey of Canada, 1901.—This is a very useful catalogue, and gives for the first time a concise record of our present knowledge of the Marine Invertebrates of Eastern Canada. The work contains 271 pages, of which 98 are devoted to the mollusca, 100 species of *Pelecypoda*, 5 *Scaphopoda*, 166 *Gasteropoda* (including 8 *Polyplacophora*), and 13 *Cephalopoda* are listed, with ample notes on their geographical and geological distribution and bathymetrical range.

GUIDE TO THE GEOLOGY AND PALEONTOLOGY OF NIAGARA FALLS AND VICINITY. By A. W. GRABAU (Bull. Buffalo Soc. Nat. Sci., VII., No. 1, 1901). The Buffalo Society of Natural Science has appropriately signalized the Exposition year by issuing a volume bearing the above title, containing a full and readable account of the local geology and paleontology. On account of its situation, the geology of Niagara is of course of far greater than local interest, since the intensely interesting and complex history of the Great Lakes is involved, so that the mass of data presented deals with subjects of wide interest. It is suitably illustrated with excellent maps and views. The paleontological part consists of an untechnical account of the fossils of the region, properly illustrated by good figures.

Chapter V., by Miss Elizabeth J. Letson, describes the postpliocene fossils of the Niagara River gravels, and dealing with species still existing has special interest for conchologists. Some 17 species of Gastropoda and 14 Pelecypoda are discussed and illustrated. Among the more notable species may be mentioned the carimate form of *Goniobasis livescens* var. *niagarensis*, which reproduces the contour of *Anculosa carimata; Amnicola letsoni* Walker, an apparently extinct species; some peculiar forms of *Limnæa desidiosa* and *catascopium*, and a series of *Unionidæ*, very interesting to the student of geographic distribution :—*Lampsilis rectus*, *ellipsiformis*, *Uniogibbosus*, *Quadrula solida* and *coccinea*—forms speaking clearly of a former connection between the Great Lakes and Mississippi drainages. All of the species are illustrated with original figures. The work is well done, and cannot but prove useful for many years to come.



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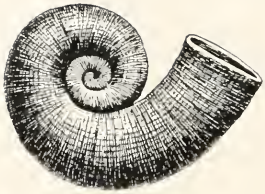

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1, 2. Ceratodiscus solutus H. & S.
3, 4. Cerion marmoratum Pfr.
5. Ctenopoma hydii Weinl.
6. Chondropoma hjalmarsoni Pfr.

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LAND SHELLS OF FORTUNE ISLAND, BAHAMAS.

BY J. B. HENDERSON, JR.

Fortune Island is one of the Bahamas belonging to the Crooked or Long Island group, and which is separated from the more westerly groups by a deep arm of the sea. Geologically it is in every respect similar to the other Bahamas. The little island is but four or five miles long and from one to one and one-half miles in width, with an elevation scarcely exceeding thirty feet. Its surface is rough with flat fragments of "eolian" limestone, and the entire island is covered by a dingy-colored scrub growth of trees and shrubs. A few clumps of graceful palms scattered here and there relieve somewhat the monotony of the dreary aspect. A wide beach of silvery coral sand encircles the island, glittering like a mirror by day and superbly bright in the moonlight. Singularly enough the only shells we found cast upon this beach were Cerion. Occasionally low cliffs of eolian rock extend down to the water's edge, and at such places, *Tectarius muricatus* L., *T. trochiformis* Dillw., and *Litorina lineata* Phil., were discovered.

The scrub vegetation affords but little shade, and the ground is baked by a powerful sun whose rays oppress the weary collector as they seem to enliven the swarms of sand-flies and mosquitoes. A diligent search from daylight to dark brought to our bag but four species of land shells, although individually these were quite abundant.

1. *Cerion marmoratum* Pfr. Generally dead specimens found under bushes. A considerable range of variation exists, the extremes of which are illustrated on Plate V, figures 3 and 4.

2. *Cepolis* (*Hemitrochus*) *milleri* Pfr. The color varieties of this really beautiful shell are infinite—indeed, no two specimens are entirely alike. They cling to the under side of leaves and to the stems of a certain species of shrub. Dead shells are scattered about in the debris of fallen leaves.

3. *Ctenopoma hydii* Weinl. Under slabs of eolian limestone; about the roots of trees; among fallen leaves. There is no actual difference between this species and *C. bryanti* of Great Inagua. I believe it is also reported from Long Island. (Plate V, figure 5.)

4. *Chondropoma hjalmarsoni* Pfr. Same station as the last. This shell has a decided Haitian appearance and has evidently been identified as *C. semilabre* Lam. It is doubtful if Lamarck's species ever occurs out of Haiti, indeed I am inclined to believe it is confined to the "cul de sac" region of that island. *C. hjalmarsoni* is more obese than *C. semilabre*, its decussated sculpture is not conspicuous, the revolving striæ are more pronounced and the longitudinal striæ less so than in the Haitian shell. (Plate V, figure 6.)

Fortune Island is easily accessible from New York, and offers an excellent base for exploring the neighboring islands of the group; however, it requires much patience to tarry in a desert of poor collecting when the larger Antillean islands with their magnificent mountains and forests and incomparable molluscan richness lie but a day beyond.

COLLECTING SHELLS IN MONTANA.

BY MORTON J. ELROD, UNIV. OF MONTANA.

The State of Montana is not very productive of conchological specimens. The conditions are all against shell growth. The rivers are rapid, the water quite soft, and food in the rivers scarce. The large lakes, as Flathead lake, contain clear, cold water. They are usually deep, with rocky bottoms, and surrounded by mountains with steep slopes. The marshy, stagnant parts of the lakes are usually small. The mountain sides in summer become dry and parched, except in protected portions and along the streams. Great stretches of plain are without moisture for a portion of the summer, drying up every living thing that cannot move to the water-courses. The days are hot, the nights cool. In this mountainous State, where very little

soil is lower than 3000 feet above the sea, the air is dry and evaporation rapid. A passing rain-cloud may leave considerable moisture, but it is soon taken up by the parched earth or evaporated if left on the surface. Stagnant ponds with decaying vegetation are few and confined to the vicinity of the few rivers. Even such ponds usually become dry each summer.

No doubt the western mountain region will produce some excellent material for study of variation through isolation, when collections have been made more extensively. Most of the valleys were former lake beds of greater or less extent. As these lakes have been drained, they left swamps in which rhinoceroses, camels, three-toed horses, elephants, titanotheriums, and other beasts have become mired, their remains being buried for long ages. These swamps have dried up, and the waters have become more widely separated, now occurring as deep mountainous lakes, or larger lakes, which are mere expansions of rivers. Such isolation must have caused the separation of shells of a species which naturally would take different lines of development. Accompanying this gradual separation of waters we might expect a region of moisture on the land adjacent to the lakes, giving suitable environment to the land snails.

As a result of the above conditions, we may expect great variations in adjacent regions, where the barriers may be sufficient to cut off all communication between the regions. Such variations have been illustrated in part by Hemphill's suite of *Patulas* (*Pyramidula*), in the Lichtenthaler collection at the Illinois Wesleyan University. This has also been shown by collections made in the Sandwich Islands. There is very little doubt but that the isolated lakes in Montana and the northwest will produce interesting variations. But the sparsely-settled country and the small number of collectors makes the work of collecting and studying very slow. This may be better understood by a practical application. The State of Montana has an area of 146,000 square miles. So far as the writer is able to discover, he is the only resident of the State who has collected fresh-water and land shells, and this has been done at odd moments while prosecuting other lines of work.

The accompanying list is not large. Five species is the maximum taken in one day. Those taken from mountain sides represent much toil for a few scattered specimens. The list, incomplete as it must be, represents the specimens collected at intervals during the past

three years, and is given as a basis for work, with the hope that others may add to it. The species are all from the western side of the range, or Pacific slope, with the exception of a few, which are properly indicated where they are discussed.

Missoula is located in a valley in which the Hell Gate and Bitter Root rivers unite to form the Missoula river. West of the Bitter Root river the Bitter Root range of mountains extend parallel with the river in a northerly and southerly direction. So far the writer has explored but a few spots in these mountains and along the rivers. But the results have been surprisingly good. North of the valley lies the Cabinet range, rugged and broken. Few spots in this have been examined. Across the Cabinet range lies the Flathead Indian Reservation. The crest of the Mission range marks the eastern border of the reserve. The Mission range extends almost due north and south for a distance of nearly a hundred miles. The southern end contains the highest peaks, reaching 10,000 feet, while the northern end slopes down to the Swan river, and has been ground smooth by glacial action.

Out of the Mission range four large creeks flow across the Mission valley, joining each other or the Pend d'Oreille river, which is the outlet of Flathead lake. The range makes the eastern bank of Flathead lake for its entire length. In the cañons of this range numerous small lakes lie nestled among the hills, invisible until one comes suddenly to the bank. Sin-yale-a-min lake is at the base of Sin-yale-a-min peak, at the southern end of the range. A ten days' camp at this lake brought to light probably all the shell fauna to be found. To the north the mountain produced the very interesting variety of *Pyramidula strigosa* described later.

McDonald lake is 15 miles north of Sin-yale-a-min lake, 500 feet lower in altitude, at the base of McDonald peak. Ten days at this spot produced several quarts of *P. elrodi* Pils., besides the first living shells. Another camp at Crow creek produced several valley shells. Several camps at different points on Flathead lake produced other species from the sands and from the water. Swan lake is on the eastern side of the Mission range. A camp on this lake added one to the list in the western part of the State, not found elsewhere.

While the collecting represented by these notes has extended through four summers, the results will probably be modified when a further study of the extensive country has been made.

The identifications have been made for the greater part by H. A. Pilsbry and W. H. Dall, and for this and other courtesies thanks are hereby extended.

Margaritana margaritifera L.

This is the only species of bivalve mollusk of the family *Unionidæ* taken. It has been found at several places in the Bitter Root river above the junction of this river with the Missoula. At one place a colony was found on a sand bar, when about a peck of live specimens were taken. At another they were found, in March, clinging to the rocks where the water was swift. They were captured by inserting the tip of a switch from a tree between the valves. The shell was closed on the limb, and the specimen pulled from the water. In this way a dozen or so were secured. Pieces of shells have been seen around Flathead lake, but no living specimens taken. In 1900, several dozen were taken in Crow creek, Flathead Indian Reservation. The species is found in all the western mountain streams. At no place is it abundant, and many people who have lived in this country all their lives express surprise at seeing these shells and hearing they are from waters in the State.

A NEW SPECIES OF LIOMESUS.

BY W. H. DALL.

Liomesus nassula n. sp.

Shell solid, white, covered with a pale olive, slightly-hispid periostracum, with a rather elevated, subacute spire of seven whorls; suture distinct, not channelled; apex somewhat eroded with a small blunt top; surface of the whorls delicately sculptured with fine revolving threads, four or five to a millimeter, of which about every fourth thread is perceptibly stronger than the other three; these are crossed by still finer, sharp, elevated, arcuate, incremental lines, along which the hispidity of the periostracum is arranged; pillar white, solid, twisted, funicular distally; canal very short, wide; outer lip thin, simple, with a concave flexuosity behind the periphery; body with a thin white callus. Alt. 42, max. diam. 22, lon. aperture 17 mm.

Dredged in 121 fathoms, sand, near the Pribiloff Islands, Bering Sea, by the U. S. S. Albatross.

This interesting addition to the genus has a sharper spire than any other species and a different sculpture. It is perhaps nearest *L. canaliculatus* Dall, which has coarser sculpture and a channeled suture.

A NEW TETHYS FROM CALIFORNIA.

BY T. D. A. COCKERELL.

Tethys (*Neaplysia*) *ritteri*, n. sp.

Length 21 cm., breadth about 8 cm. Dark grayish-olivaceous; sides with oblique, flame-like, blood-red markings, especially about the middle of the body; upper surface of the head and outer surface of epipodial lobes mottled with brown, but without any conspicuous blotches; inner surface of epipodial lobes and mantle covering shell pale sea-green, wholly without markings; lobe overlapping branchiæ deep rich purple; when the shell is removed, the area beneath it is seen to be strongly suffused with dark purple; branchiæ purplish-grey; sole 45 mm., broad, transversely grooved and corrugated, greyish-brown, inclining to coffee-color; epipodial lobes about 80 mm. long and 28 broad, from base within ends of lobes to nearest part of sole about 67 mm.; anterior tentacles 11 mm. from inner base to tip; posterior tentacles 14 mm. long.

Shell very thin, flexible, corneous, 58 mm. long, 42 broad; accessory plate well-developed.

The animal produces an abundance of a reddish-brown fluid. The muscular stomach or gizzard contains eleven pentagonal corneous bodies, which fit raised areas on its wall. The largest of these bodies was $14 \times 10\frac{1}{2} \times 10\frac{1}{2}$ mm. The alimentary canal contained seaweed.

Hab.: San Pedro, California. The specimen described was found cast up on the shore of the bay, just in front of the University of California Marine Laboratory, July 23, 1901. Others were obtained by workers at the laboratory; one of these, which I saw, had been in formalin, and the red, flame-like markings had wholly disappeared.

This animal has the structure of *T. californicus* (Cooper), which was also described from San Pedro, but the color-scheme is so entirely different that it must be assumed that the species are distinct. Should any reason hereafter appear to the contrary, *T. ritteri* will at least be a very distinct variety. It is named after Prof. Wm. E. Ritter,

director of the Marine Laboratory at San Pedro, in recognition of his important services to marine zoölogy.

JAPANESE VIVIPARA IN CALIFORNIA.

BY ROBERT E. C. STEARNS.

In the NAUTILUS for February, 1892, Mr. Williard M. Wood mentions the presence of "Paludina Japonica" (as determined by Mr. W. J. Raymond), in the Chinese market in San Francisco, where he saw a bucket-full of living specimens, being part of the first lot brought alive from Japan, where they are collected in the rice-fields near Yokohama, and are sold for a few cents a quart. They are called by the Chinese "Tsen law." Subsequently Mr. Wood (NAUTILUS, September, 1892), mentions seeing the same species and certain forms of *Anodonta* in an aquarium in a shop in the Chinese quarter of San Francisco.

A year or more ago, Mrs. A. E. Bush, of San José, sent me a few examples of a *Vivipara*, a quite familiar Japanese form. One living specimen sent to Dr. Pilsbry, he kindly determined for me as *V. stelmaphora* Bgt. (= V. *malleata* Rve.), "it is a female and gives us plenty of young," etc. From Mrs. Bush's note it appears that the species may now be collected, or might have been at the time she sent the specimens, in San José, and also in a little valley at the foot of Mount Hamilton. The examples received from her were collected at the former place. The first specimens from the several regions were detected by a boy, at a point seven or eight miles from San José. In wheeling over the floor of a little lake that was dry at the time, he picked up the shells and gave them to a friend who was interested in conchology.

From the above it is quite evident that somebody planted this Asiatic form thereabout, presumably some of the Japanese or Chinese living in the neighborhood. It may be remembered that the European *Helix aspersa* was planted in San José forty years ago; in course of time the mollusca of the region may exhibit quite a cosmopolitan aspect.

Los Angeles, Cal., Oct. 22, 1901.

THE SHELL-BEARING MOLLUSCA OF RHODE ISLAND.

BY HORACE F. CARPENTER.

The earlier portion of this paper appeared in Volumes III. and IV. of this Journal.]

199. *Yoldia sapotilla* Gould.

Nucula sapotilla Gld., DeKay, Sby., Hanley; *Leda sapotilla* Stimp., S. I. Smith, Reeve; *Yoldia sapotilla,* of modern authors.

Shell elongated ovate, thin, fragile, translucent; beaks nearly central, a little nearer the anterior end, not elevated; anterior portion of the shell semi-oval, regularly rounded, posterior narrowed and compressed but not so much so as in *Y. limatula*; surface with very minute concentric lines; epidermis thin, glossy, bright yellowish-green with one or two narrow zones of a darker shade; interior white and pearly; hinge with sixteen long and pointed teeth on each side of the beaks, those near the center small and close together. Length $\frac{9}{10}$, height $\frac{4}{5}$, breadth $\frac{8}{10}$ inch.

This species is comparatively rare and local, but inhabits soft mud in deep water from Long Island to the Arctic Ocean. It has been dredged in Provincetown Harbor by Col. Joseph G. Totten, and in Long Island Sound by Mr. S. Smith. Prof. A. E. Verrill has dredged it off Gay Head, 19 fathoms; Buzzard's Bay, 25 fathoms; east of Block Island, 29 fathoms; and in Casco Bay and Bay of Fundy, 4 to 100 fathoms. Quoted from Mass. Bay (Gould), Nova Scotia (Willis), Labrador (Packard), Greenland (Mörch).

Gould says, "In its shape and the perfect polish of its surface, this shell resembles the seed of the Sapotilla (*Achras sapota*), a tropical fruit," and for this reason he gave it its specific name.

Yoldia obesa Stimp. and *Yoldia thraciformis* Stimp. have been quoted from Long Island to Greenland, but have not as yet been found in Rhode Island.

Family Arcidæ.

The Arks are boat-shaped shells, having a straight hinge with numerous short comb-like teeth; the umbos separated from each other by a flat, lozenge-shaped ligamental area, and on the interior of the valves are two distinct muscular impressions. The animals have two hearts, each with an auricle; they spin a byssus not like the mussels, but a horny substance composed of numerous thin calcareous plates

which can be cast off and renewed whenever occasion requires. There are a large number of genera and species; they are distributed world-wide, in all seas and at all depths from low water to 240 fathoms. Fossil arks are abundant in all ages. There are several groups of this family, one of which is sedentary in its habits, adhering to crevices in rocks; another group *Scaphula* Benson, an East Indian genus, lives in fresh water, a thousand miles from the ocean; others live in sand or mud and move about freely. We have two species in New England, although a third, *Arca ponderosa* Say, is occasionally washed up on the beach at Edgartown, Martha's Vineyard.

200. *Arca* (*Argina*) *pexata* Say, 1822.

Shell oblong, thick and solid, very inequipartite; beaks prominent, ventricose, pointing obliquely forwards, terminating in points which are nearly in contact, surface with 32 to 36 broad radiating ribs, crossed by minute lines of growth, the whole covered with a very coarse, brown hairy epidermis; interior white, the margin polished and deeply crenulated by the alternate termination of the ribs and grooves; hinge with a series of small teeth. Length $2\frac{1}{2}$ inches, height 2 inches, breadth $1\frac{1}{2}$.

This species is very abundant in Narragansett Bay and has been quoted from Cape Cod to Gulf of Mexico. I think it must be very rare and local south of Long Island Sound, as collectors south of New York seem to consider it a rare species. It is distinguished from all others of our marine shells by its rough, dirty epidermis, which is thick and hairy, generally detached in places and can be torn off in long strings. The fishermen call it the hairy clam. It is not an attractive looking object when found alive, and is still more repulsive if we open the valves, for the animal then exudes a reddish, bloody-looking liquid, from which circumstance it is often called the bloody clam.

201. *Arca* (*Scapharca*) *transversa* Say, 1822.

Shell transversely oblong, rhomboidal; beaks prominent, separated from each other by a long, narrow space; surface with 32 or more radiating ribs, the ribs and intervening spaces of about equal breadth. Length and breadth about $1\frac{1}{2}$ inches each, height 1 inch. This species is of southern distribution and is not at all common as far north as Rhode Island. It has been found from Florida to Cape Cod.

Several specimens have been collected at Nantucket and Martha's Vineyard; it is not very rare at New Haven, but I have never found anything in our bay excepting single valves. Mr. John Ford, of Philadelphia, while on a visit to Providence, a few years ago, obtained several live specimens among the oysters dredged off Bullock's Point.

Family Mytilidæ.

The mussels inhabit all shores in great numbers. Some species inhabit deep water and others frequent near high water mark, being uncovered nearly all the time and moistened by the salt water only once every twelve hours. Woodward says, "The members of this family exhibit a propensity for concealment, frequently spinning a nest of sand and shell fragments, burrowing in soft substances or secreting themselves in the burrows of other shells." In speaking of the animals, he says, "Animals marine or fluviatile attached by a byssus." There are no fluviatile members of this family, although one species, which will be spoken of hereafter, seems to live equally well in either fresh or salt water.

Genus *Mytilus* Linné, 1758.

The mussels are easily recognized by their triangular or wedge-shaped shells, which are pointed at the anterior end and broad and rounded at the posterior; the hinge is either toothless or in some species with very minute teeth. There are sixty-five species distributed world-wide, one of which inhabits Rhode Island.

202. *Mytilus edulis* Linné.

Mytilus vulgaris Da Costa; *Mytilus borealis* Lam., De Kay, Midd.; *Mytilus pellucidus* De Kay; *Mytilus notatus* De Kay (young).

Shell ovate-triangular, solid; beaks pointed, situated at the anterior end; hinge margin rising in a straight line at an angle of forty-five degrees from the basal margin, which is also straight; posterior widened and rounded, the broadest part of the shell being directly opposite the centre of the basal margin; surface covered by a dark, shining, bluish-black epidermis, under which the shell is violet; interior silvery in the centre, with dark violet margins. Length of large specimens two and a half inches, height one and three-tenths, breadth one inch.

This species, the common edible mussel, inhabits the whole of the ocean shores of the northern hemisphere, being extremely abundant

all over the northern portions of Europe, Asia and America. They are used in Rhode Island for food to a very limited extent, probably on account of the vast quantities of clams, quohogs, oysters and scallops which abound here, any of which form a much better quality of food than the mussels; but they are consumed in large numbers in Europe. The annual consumption in the city of Edinburgh is estimated at four hundred bushels, averaging one thousand to the bushel; the amount collected for bait in various kinds of fishing is enormous. In France, Norway and Russia immense quantities are gathered and used, animal, shell and seaweed together, as a fertilizer for the land. They are found in Rhode Island attached to each other by their strong byssus in great numbers. They are not buried in mud, but cluster together on rocks between tides and form beds in the banks. The young are found in deeper water and attain their growth in one year.

Mytilus pellucidus, Penn., Mont., Turt., Don., De Kay and others, considered by many as a separate species, I think is only a variety of *Mytilus edulis*. The shell is thin and transparent, beautifully radiated with blue, yellow and green zones. These marks are generally seen in specimens about one inch to an inch and a half in length and they gradually disappear as the shell gets larger; still these zones are sometimes seen in old and solid specimens, while others, one half an inch or less in length, are of a uniform shining black appearance, so that it does not seem to depend at all upon the age or size of the individuals. In every cluster of *Mytilus edulis* we find from one to a dozen or more of these pellucid, radiating ones, which if they do belong to a separate and distinct species, present an anomaly seldom seen, *i. e.*, a colony of different species of animals living together and firmly bound together by such strong bonds of friendship (or something else) as these mollusca are.

Genus *Modiolus* Lam., 1799.

The horse-mussels differ from the edible mussels in having a shell swollen at the umbos, and in having three pedal impressions in each valve, whereas there are but two in *Mytilus*. The animal burrows in mud, or clusters together under banks of grass or peat in salt marshes in some species, while others live in deep water. There are three species living in Rhode Island, one of which, however, is not a native, but has become domesticated here within about twenty years.

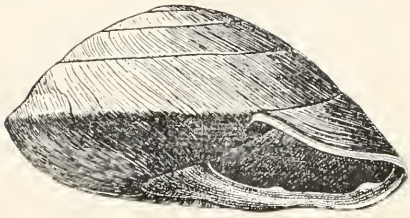
204. *Modiolus* (*Branchydontes*) *hamatus* Say, 1812.

Mytilus hamatus Say, De Kay; *Mytilus serratus* Barnes, 1823; *Modiola hamatus* H. F. Carpenter, 1865, A. E. Verrill, 1872; *Brachydontes hamatus* Perkins, 1869.

Thomas Say describes this species in the Jour. Acad. Nat. Sci., ii, p. 257, 1822, under the name of *Mytilus hamatus*, giving for its locality the Gulf of Mexico; the specimens he described were obtained from the markets of New Orleans, adhering to the shells of the southern oyster, *Ostrea virginica*. Since his time it has been found on oysters along the coasts of all the southern Atlantic States. Shell very much contracted and incurved at the beaks, which are acute; surface covered all over with elevated radiating lines, which near the umbos are divided into two and sometimes three; color black or very dark brown; interior purple with white margins. Length two and one-half inches, breadth one and a half, but sometimes as broad as long; very variable.

Gould's Invertebrata of Massachusetts, 1840, does not mention this species at all; even Binney's Gould, second edition, 1870, supposed to contain descriptions of all the marine species inhabiting the coast of Massachusetts, has not a word to say about it. It is, however, getting to be quite common in Rhode Island waters, but the collector will obtain more specimens in five minutes in the oyster markets of Providence, than he could collect at the shore in a week. The first specimens I ever saw were given me by Mr. E. H. Jenks, who obtained them in a fish market in Pawtucket; neither of us knew what they were at the time, but I pronounced them to be *Modiolus* at once. After carrying them home I referred to a volume of Say in my possession and saw by the figure and description given in it that they were *Mytilus hamatus* Say. They were attached to oyster shells. On seeing Mr. Jenks a few days after, I told him what they were, but added, "they are not *Mytilus* if Say does say so, they are *Modiolus* just the same." Since then the species has become domesticated in our bay, having been brought here alive on the southern oysters and transplanted in these waters. I have found a few specimens in our bay not attached to oysters, stones or anything else, but its proper habitat is on valves of *Ostrea virginica*, adhering by a short, stout byssus.

In November, 1870, Mr. Geo. H. Perkins published the "Molluscan Fauna of New Haven," in which, speaking of this species, he says, "An examination of the *animal* has led me to consider it a *Modiola* rather than a *Mytilus*." He described it as a *Modiola* under the sub-generic name of *Brachydontes* Sw., 1840. In 1872, Prof. A. E. Verrill, in the March number of Silliman's Journal, p. 211, says, *Modiola hamatus* = *Mytilus hamatus* Say. New Haven harbor and vicinity, usually attached to oysters.



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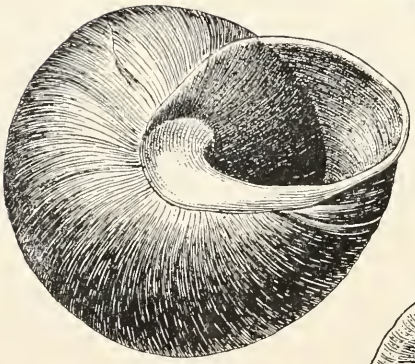

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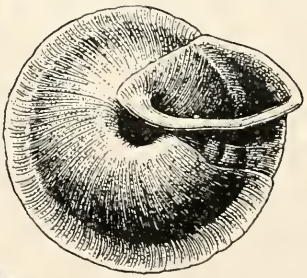

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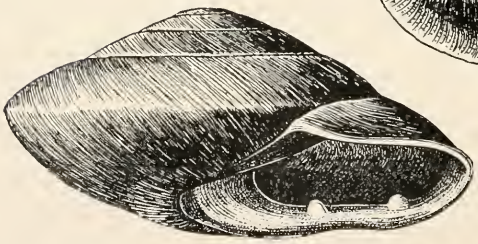

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VENDRYES: NEW SPECIES OF PLEURODONTE.

THE NAUTILUS.

VOL. XV. JANUARY, 1902. No. 9.

A DAY ON THE GREAT BARRIER REEF

BY CHARLES HEDLEY.

"All hands on deck!" Ugh! "The billy's boiled!" Groan. "The tide is falling fast!" That fetched your conchologist. Sleepily he crawled out and reached for his mug of hot tea. Balancing himself on the combings he looked abroad.

Far in the west the jungle-clad mountains of tropical Queensland loomed soft and blue. Between lay a purple sea which in the near distance suddenly changed to the vivid green of shoal water. To windward a beach of coral sand showed white and bright under the dense foliage which smothered a long, low island. Beyond it a line of foaming breakers stretched to the sky-line. Back against the white surf there rose the bristling fangs of the reef, rank after rank passing in long perspective out of sight. Below in the clear water, the links of the cable lay as sharp on the sand as if the cutter had floated in the air. Down overboard a blue starfish (*Linckia*) slept, here a prickly urchin, there a madrepore.

Regardless of scenery the party munched their damper, and asked what was the scarlet tree ashore, and should the cook be keel-hauled for opening plum jam instead of marmalade.

"Get the dingy up and look alive!" quoth the captain. Into her tumbled all hands, Mr. Conglomerate, the captain, the cook, the jib-sheet hand, and Mr. Conchologist. Safe in the locker are stowed all the nice town clothes. A soft felt hat, flannel shirt, tweed pants, belt and sheath-knife, and big laborer's boots with thick socks rig out a man for the reef. Mem. tie your boots with string instead of

laces for wading. Our tools are a geological hammer, a four pound sledge, a crowbar, all the cans and buckets available, a pocket-full of corked tubes and a pocket lens fastened to the waist with a key-chain, such as bank clerks use. A big shooting bag is a handy thing to sling over the shoulder. A design for reef collecting which we never put in practice was a belt like a soldier's cartridge belt to hold tubes instead of cartridges. Not only could molluscs, worms, etc., be packed apart, but such useful things as alcohol, formal, or picric acid would be at hand in small quantities. In practice we filled, say the left trouser pocket, with empty tubes. When a specimen is found it is important not to lose sight of it, and one hand may be engaged holding the rock. With the free hand a tube is taken, the cork pulled out with the teeth, the specimen bottled, the tube filled with sea water and stowed in the right hand pocket.

Now we pull in among the corals and jump overboard. "But what is the thing like a barrel stranded yonder?" "That, Mr. Conglomerate, is a *Tridacna gigas*." A real, live, giant clam, with jaws gaping like a crocodile, lying high and dry and loose upon the reef. Between the jaws are living jewels of green and gold, thick strewn on living velvet. With a convulsive jerk the shell half closes and gaps again. "I've seen plenty bigger nor this; do you want him, Mr. Conchologist?" asked the jib-sheet hand. "Yes, take that." So he drove the end of a board hard down in the centre of the gape. That disabled the monster. The cook plunged in a butcher's knife, dexterously peeled back the gorgeous mantle, slipped off the huge adductor muscle and unceremoniously threw out the carcass, bigger than a leg of mutton, on the sand.

The conchologist who ordered the execution feels, well, just a qualm of remorse, as the men hoist the shell to the boat. Anyhow he never collected a bigger shell. And then for an instant, the sunshine and the sea were swept away and the magic of memory flashed out a picture of distant lands and days; faint incense, cold and gloom, past rows of marble pillars and stained glass windows, to a small conchologist gaping with amazement at his first *Tridacna*, the the holy-water basins in St. Sulpice.

Again the ripple on the water, the sunshine and the sea. All about the giant lay lesser clams, *Hippopus*. "How do you tell one from the other, captain?" "Why, look at the meat," says he. And sure enough, we saw that *Hippopus* lacked the jewelled eyes of

his great brother. Queer topsy turvy molluscs these, lying hinge down, gape up. And yet they have turned round in the shell and live heart up, foot down, like other bivalves.

"Here's something for you!" Wading across, the conchologist found four men standing at a respectful distance round one small *Octopus*. Boldly he grappled with the fearsome beast, twining and untwining the long sticky tendrils. The jib-sheet hand muttered something to the cook, and both exploded with laughter. I fear that irreverent young rascal had remarked how like the Octopus, all legs and arms, was to Mr. Conchologist himself. Now the slippery thing is gathered up and slid into the bucket. When packing time came, however, no Octopus could be found; evidently it climbed out when the gaoler's back was turned.

Another big coral block, over with it. A scuttle of little crabs, as they clatter down small holes, a shrinking of things soft, a twisting and a writhing of things neither hard nor soft; among them is a particularly energetic bunch. Left alone it unwinds into a huge Brittle star; casting a couple of cables into the water beneath, the Brittle star lowers itself along itself to the sea, pulls after itself the cords which are itself, and tucks itself, body and ropes and running rigging, comfortably into a crack in the coral.

This is a land of big things. Here is a huge sea anemone, bigger than a dinner plate, *Discosoma*, with all its tentacles spread abroad. A gorgeous little fish, crimson with a white bar, has made friends with the anemone and at the least fright swims to its capacious bosom and nestles safe among the poisonous tentacles.

And here is the Chinese dainty, the bêche de mer, a dozen different kinds of them. The commonest Holothurian is a long, black, snake-like species. When feeding they sweep all around with their branching tentacles, grasping a miscellaneous catch of foraminifera, shells and sea-weed, and thrust the mass down their throats. Another bêche de mer has earned the name of cotton-fish, because when handled it voids a mass of white glutinous threads, troublesome to clean from hands and clothes.

"Pass the crow-bar and up-end this block. A heave, my hearties, and up she goes!" "A mutton-fish," says the jib-sheet hand, and grabs it. *Haliotis asinina;* now we always did think that narrow shell could not contain the body, and here it is like *Scutus* or *Umbrella* or *Lucapina*, only a shield upon the back. "And those, toe-

nails you call them, not a bad name either. I call this *Acanthochites* and that *Cryptoplax*." As the conchologist crooks his finger round a live *Stomatella mariei*, the creature falls asunder. Like a Gecko, he would ransom his body with his tail. *Gena* does the same in Sydney harbor; *Harpa* is said to know the trick.

"What are you doing?" asks Mr. Conglomerate, strolling up. "Smashing up *Heliopora*? What a shame!" And so it is, to wreck the beautiful blue branches, but we seek all manner of queer things hidden in corners, and *Gephyrean* worms and *Lithophaga* burrowing inside. A few odd urchins and star-fish are overhauled for *Stylifer* without success.

And see under the water what looks to the eye like a mass of white down, but to the finger feels hard. We read the riddle with a chop of the crow-bar; the fragment shows tiny crimson rods packed together, and partitioned off into floors and ceilings. It is a lump of *Tubipora musica* in full bloom.

Out in the broad daylight lie the Strombs, they love the little sandy pools among the rocks. The sociable big *Pterocera* lie around in scores, not too proud to foregather with their humble cousin *S. luhuanus*. There is nothing shy about a Stromb, it vigorously resents being picked up, and kicks like a *Nassa*, lashing out water with its operculum, and thrusting out its beautiful big, green eyes, on their long stalks, it stares boldly at its captor.

But now the tide is rising fast. Soaked and tired and hungry we must leave our hunting ground. Though bags and buckets and tubes are crammed, yet we have scarcely tasted of the riches of the reef. All to-morrow, next week, and next month we might collect without exhausting it.

Back to the cutter we row over fields of deeper corals, scarlet gorgonias, parrot fish glancing blue and gold and green, *Monacanthus* in armour of black and red, over madrepores ten feet across, like tables spread with dainty lace and edged with violets.

Then we climb aboard and snatching a hasty meal as we work, face the only tiresome labor of the day, the labelling, sorting and packing of our catch.

At last the jars and kegs are screwed down. Let us pass the pannikin along for rum, light a pipe, stretch luxuriously on the hatch and lazily watch the ghostly gleam of the zodiacal light fading in the west.

A NEW SPECIES AND SUB-SPECIES OF JAMAICAN PLEURODONTE.

BY HENRY VENDRYES.

PLEURODONTE (Pleurodonte) VACILLANS, n. sp. Pl. VI, figs. 1, 2, 3.

Shell rather solid, very slightly dilated transversely, depressed turbinate above, depressed convex below; color brown all over, deepening slightly in tint and simulating an indistinct band running along the centre surface of the spire whorls (except the apical) with a dark brown band below the periphery of the last whorl encircling the base of the shell and fading off to very light about and around the umbilical region; whorls a little more than five, apical obtuse, the rest subplanulate except the last which is impressed above the periphery and somewhat inflated above the impression; the periphery subacute and descending slightly near its extremity; suture linear, impressed. Sculpture on part of the antepenult whorl apparently the same as in *P. carmelita*, in the rest for the main part, of irregularly raised, drawn out growth lines, coarse in some places and very fine in others; aperture peroblique, sublunate, livid shining within in fresh specimens; peristome not so stout as in *P. carmelita;* the extremities joined by a callus spreading across the parietal wall, upper margin simple, somewhat sinuously depressed above near its commencement, basal margin reflexed, widening, and adnate for some distance to the base of the last whorl which is inflated, but less so than in *subacuta.* There are two small distant teeth within, like those of *P. subacuta*, but of a brown color, as is also the peristome. The umbilicus is covered in some specimens but not completely so in others; in the first case the basi-columellar part of the peristome which forms the covering shows a shallow depression over the perforation beneath. Alt. 23, diam. 48 mm.

Habitat: Silver Hill in the Parish of St. George, situated at an elevation of about 4000 feet on the northeastern slope of the chain of mountains in St. Andrew; St. Catherine Park, in the neighborhood of the habitat of *C. carmelita*, and in exactly similar stations to those which the latter frequents.

This shell so much resembles *P. carmelita* in some respects, and *P. subacuta* in others, that one may be led at first sight to confound it with one or the other of those species to which the particular specimen under examination may show a preponderance of resem-

blances. Its principal differences from *P. carmelita* are the possession of the two teeth (*carmelita* never exhibits a vestige of teeth) and the adnate peristome. These two features, however, bring it nearer to *P. subacuta*, but the sculpture, the deflection of the last whorl (or rather the descending), the color of the peristome and teeth, and the generally less inflated appearance of the shell remove it also from that species. It appears as if thrown in between *carmelita*, *subacuta* and *acuta* to exemplify the sportive tendencies of the very variable group to which they all belong.

Figures 1 and 2 are from the type. Figure 3 represents a specimen approaching *subacuta*.

PLEURODONTE (Pl.) SOROR Fér. var. PERACUTA, n. var. Pl. VI, figs. 4, 5.

Same in size as the type, but the shell is more depressed, the base less regularly convex and the outline of the spire is more conoidal. The periphery of the last whorl is much pinched and spread out into a wide, flat, knife-like carina. The base is somewhat convex below the periphery, then compressed laterally inward from it and inflated. The umbilicus is uncovered; the aperture subtriangular, narrowed transversely and forming an acute angle at the right side. A few examples are unicolored brown with the epidermis dull and flaky as in some specimens of *P. cara*, but by far the greater number of specimens are banded with dark and white, as in the type of *soror*, on the spire, and the periphery of the last whorl is white. The bands do not stop, as in the type, half way up the spire, but extend to the very suture line of the first apical whorl. The color of the shell (or of the bands) is not so intense, or pure or lustrous white as in the type. The shells somewhat resemble small banded forms of *P. peracutissima*, but they have the teeth of *soror*. A specimen received from Chitty is marked "*soror*?." From Lower Maysfield in in the Parish of St. Elizabeth.

A NEW SPECIES OF VOLUTOMITRA.

BY W. H. DALL.

This genus has long rested on its typical species, the *Mitra grönlandica* (Beck) Möller of the Arctic Atlantic Seas. The discovery of another species, therefore, possesses somewhat more than the ordinary interest.

Volutomitra alaskana n. sp.

Shell fusiform, with about six moderately convex whorls; suture distinct, surface wholly minutely spirally striated, covered with an olivaceous periostracum over a white or yellowish shell; aperture longer than half the total length, with a rather wide canal, callous pillar and body in the adult, and simple outer lip; the canal has a well marked siphonal fasciole, and is slightly flexuous; plaits normally four, rarely three or five, strong and rather distant; nucleus almost always eroded; lon. 44, diam. 17.5; lon. of aperture, 26 mm.

Habitat in the southern and eastern parts of Bering Sea and the Aleutians, in 60 to 85 fathoms, muddy bottom, and southward in constantly deeper water, following the temperature of 39° Fahr. to a point off San Diego, California, in 822 fathoms.

This species differs from *V. grönlandica* in its much greater size, less rufous color, and pervasive fine spiral sculpture, but otherwise is very similar. It was first dredged by the writer in the eastern Aleutians, and has since been obtained by the U. S. Fish Commission. The Atlantic species is usually about 18, but reaches 27 mm. in length, and is smooth above, with a few coarse spiral striæ on the base.

COLLECTING SHELLS IN MONTANA.

BY MORTON J. ELROD, UNIV. OF MONTANA.

[*Continued from page 89.*]

Sphærium partumeium Say.

This beautiful shell is common in the ponds near Flathead Lake and around Missoula. They live in the dense vegetation, in company with Planorbis trivolvis, larvæ of Odonata, Cyclops, Daphnia, and numerous water insects. They are gathered by pulling out a mass of the vegetation, picking it to pieces, and here and there finding the delicate shells. A single dead shell was found on the beach of Swan lake. None have been discovered in the small cold water lakes in the Mission mountains.

Planorbis trivolvis Say.

This cosmopolitan species is the most abundant thus far found, and has been taken in most of the ponds where shells are found. It has been taken around Missoula in the streams, in the lakes of the

Mission Mountains as high as 3800 ft., in the ponds bordering Flathead Lake, and in Swan Lake.

Estey's pond covers some 10 or 15 acres, three miles from the Biological Station, and a mile from Flathead Lake. In August, 1900, the shores of this pond were literally covered with dead shells, and great quantities of live ones in the water.

It was here that a very interesting experiment was performed with these shells and a large frog. A dead shell was tossed in front of the frog, close to his nose. The shell was immediately seized, and an unsuccessful attempt made to swallow it. It was disgorged by the aid of the fore feet. A second attempt gave the same result. This was continued until the frog had seized the eighteenth dead shell, when he seemed to weary of the sport, and took a rest. After this he would seize only now and then, and only those in easy reach. After the 23d shell had been seized he no longer made any effort, and a good sized pile of shells was made with no result. Other attempts on other frogs gave practically the same result, with a slight variation in the number.

Planorbis parvus Say.

In August, 1897, while camped on the bank of the Pend d' Oreille river a couple of miles below the outlet at Flathead Lake, some sand siftings produced a dozen or more of these small shells.

(*To be continued.*)

THE SHELL-BEARING MOLLUSCA OF RHODE ISLAND.

BY HORACE F. CARPENTER.

[*Continued from page 96.*]

203. *Modiolus modiolus* Linné.

Mytilus modiolus Linn., Wood, Don. Chem., DeKay. *Modiola modiolus* Turt., Gld., Perkins, Dall.

Shell large, thick and solid, oblong-ovate; beaks at the anterior end which is narrow; posterior broad, rounded; hinge margin straight, ascending from the beaks at an angle of forty-five degrees to the centre, then curving downward to the posterior end; basal margin arched a little upwards near the centre, gaping at this point for the passage of a byssus; epidermis dark brown, thick, folding

over the margin; interior pearly, of a livid color. Length four and a half inches; height two and a quarter; breadth two inches.

It inhabits the ocean in deep water, attached to the larger seaweeds, and is thrown up on ocean shores in storms, the seaweeds being torn from the rocks by the action of the waves and dashed upon the beach. Sometimes these shells attain a length of six inches and are subject to great variety of form, being almost always distorted in some manner. In young specimens, the epidermis at the lines of growth is prolonged into filaments.

205. *Modiolus plicatulus* Lam.

Shell transversely oblong-ovate, elongated, narrowed at the anterior and broadened at the posterior; beaks at the anterior end; hinge margin straight, ascending for two-thirds the length of the shell, then curving downward and rounding at the posterior to meet the basal margin; surface ornamented with numerous radiating, sometimes undulating, prominent ribs; a broad elevated ridge runs from the beaks to the posterior end of the basal margin, dividing the shell into two nearly equal parts; on the upper half of the shell thus divided, the ribs are large and coarse, but on the lower half they are very fine, merely lines on a smooth surface; exterior silvery white, covered by a thin varnish epidermis of a brown color, rayed with zones of yellow, green and black; interior silver white; margins crenulated. Length three inches, height one and a quarter, breadth nine-tenths.

This species, with the exception of *Mya arenaria* and perhaps *Ilyanassa obsoleta*, is the most abundant mollusk in R. I. It inhabits everywhere in mud, peat bogs, salt marshes and in the banks of rivers. It is found up the Blackstone nearly to Pawtucket, where the fresh water is continually pouring over the falls, as well on the shores of the bay and ocean. Its station is everywhere above low water, and they cluster so thickly together as to frequently form banks a foot or two in depth imbedded near high water, forming beds sometimes hundreds of feet in length by ten to twenty in width. When found completely buried in mud, they are generally preserved in good condition, but if taken under any other circumstances, the epidermis is found to be badly eroded, not only at the umboes, where shells usually exhibit this peculiarity if at all, but all over the surface. They may be gathered in any quantity in Providence, in the banks of the river road, above Red Bridge.

Genus *Crenella* Brown, 1827.

There are five species, one of which inhabits New England.

206. *Crenella grandula*, Totten.

Syn: *Modiola glandula* Tott. Gld.; *Mytilus decussatus* Stimp.; *Crenella decussatus* Forbes & Hanley, DeKay.

Shell small, thin, rounded oval; beaks small, separated at the anterior end, and at one half the height of the shell; surface with minute lines of growth, crossed by numerous fine radiating ribs which increase in number as they recede from the beaks; epidermis brownish-yellow; interior pearly; margins sharp and crenulated. Length one quarter of an inch, height nine-twentieths, breadth three-tenths.

This species was discovered by Col. Joseph G. Totten in Provincetown Harbor, and described in Silliman's Journal, Vol. xxvi, p. 367, 1834. It inhabits sandy and soft mud in water from 3 to 60 fathoms, from Sandy Hook to the Gulf of St. Lawrence, and is often found in the stomachs of fishes. It has been dredged in various places between these points, such as Buzzard's Bay, Vineyard Sound, off Block Island, in Massachusetts Bay, Casco Bay and Bay of Fundy. It is found fossil at Montreal.

Genus *Modiolaria* Gray, 1872.

The shells of this genus are small, rhomboidal in shape, and are sculptured by two series of radiating lines, one at each end, leaving a smooth space between.

207. *Modiolaria discors* Linné.

Syn: *Mytilus discors* Linn., Loven, Stimp., Hanley, etc.; *Mytilus discrepans* Mont., Dill., Turt., Flem.; *Modiola discrepans* Lam., Forbes, Gld., Migh., DeKay.; *Crenella discors* Gray, Adams, Forbes and Hanley; *Modiolaria discors* Loven, Binney, Dall, etc.

Shell obliquely-oval, beaks near the anterior end; surface coarsely marked by lines of growth and divided into three fan-shaped spaces, the anterior portion with eight fine lines radiating from the beaks to the basal margin, the middle portion smooth and the posterior with numerous lines radiating in an opposite direction from those on the anterior end of the shell; interior silvery. Length one inch, height thirteen-twentieths, breadth two-fifths.

Circumpolar: from Greenland to Long Island; from Finmark to Great Britain; Bering's Straits to Puget Sound. Inhabits from

low water mark to 100 fathoms, also found in the maws of fishes. Common everywhere north of Cape Cod, rare and local to the south of it. Two other species, also circumpolar in range, the Modiolaria nigra and M. corrugata, are said to have been found as far south as Buzzard's Bay, but as I have no idea they will ever be found in R. I., I do not include them in these papers.

(*To be continued.*)

GEORGE B. SIMPSON.

George Bancroft Simpson was born in 1841 at Boston, Mass., removed to Waterbury, Conn. at an early age, and in 1861 enlisted in the army for the Civil War. At the close of his service he entered Yale College, but was unable to complete his course for lack of money. In 1868 he came to Albany and began work with his uncle, the late Prof. James Hall, State Paleontologist, as a collector of fossils. Subsequently he took up the drawing of fossils and became highly skilled in this work. Thousands of the fine drawings which have illustrated the *Paleontology of New York* being his handiwork.

He was a devoted lover of nature, and was the author of a useful work on the anatomy of the fresh water clam (*Anodonta fluviatilis*), and had just completed an elaborate treatise on the anatomy, physiology and embryology of *Polygyra albolabris* and *Limax maximus*, at the time of his death, which occurred October 15, 1901.—J. M. C.

PUBLICATIONS RECEIVED.

The Mollusca of Porto Rico. By William H. Dall and Charles T. Simpson. (Extract from U. S. Fish Commission Bulletin for 1900, Vol. I, pages 351–524.)

This work really constitutes a hand-book of the mollusca of the island, as it contains brief descriptions of the genera and species with references to the original descriptions and principal synonymy, illustrated by 6 plates containing 102 figures. The total number of species recorded is 653, of which 42 are new. Excluding the land and fresh water shells and nudibranchs the number of species and well-marked varieties is 530, and an estimate is made of 600 species. "It has been one of the surprises that a number of species originally described from deep water in the Blake report, turned up in less than 100 fathoms in Mayaguez harbor or other localities."

Some important changes in nomenclature are noticeable: The genus *Pyrena* Bolten, 1798 (*Conidea* Swain), is adopted for *Columbella ovulata*, and *Nitidella* Swains., is given generic standing. *Ultimus* Bolten is used generically for *Ovula gibbosa*. We can hardly agree with the authors in some of the names they still retain in the old family *Tritonidæ*, for which they use a new term *Septidæ*. If one name of an author having priority is used, why not use others that can be as readily identified? If *Septa* Perry, 1811, can by elimination be used for *Triton* Montf., why not use *Monoplex* Perry, instead of *Ranularia* Schumacher 1817, and *Aquillus* Montf., 1810, for *Lampusia* Schum.? *L. cynocephala* Lam., certainly belongs to *Ranularia* rather than *Lampusia*. The family name *Septidæ* probably deserves adoption, as the genus *Septa* contains one of the largest and most beautiful shells in the world (*Septa tritonis*), although it is not perhaps the most typical, nor the oldest genus of the family.

The Mollusca of the Persian Gulf, Gulf of Oman and Arabian Sea, as evidenced mainly through the collections of Mr. F. W. Townsend, 1893–1900; with descriptions of new species. By James Cosmo Melvill and Robert Standen (Proc. Zool. Soc. of London, 1901, pp. 327–460). Part I.—Cephalopoda, Gastropoda and Scaphopoda.

This valuable and interesting paper adds greatly to our knowledge of the oriental species and their geographical distribution. Upwards of 935 species are recorded, including 77 new species and one new genus (Argyropeza) in the family of *Litiopidæ*. Some families are unusually well represented; of the genus *Conus* 41 species are recorded, while those usually restricted to the *Pleurotomidæ* number 100 species, 20 of which are new; of the 54 species of *Nassidæ*, 5 are new, and there are also 5 new *Mitra* out of a total of 43 species.

As the authors have "endeavored in every case to give the name sanctioned by the laws of priority," we note several changes, although many genera having priority, and now in common use still bear later names: *Glyphis* Cpr., 1856 = *Fissuridea* Swains, 1840; *Mitrularia* Schum., 1817 = *Cheilea* Modeer, 1793; it does not belong to the *Hipponycidæ; Vertagus* Schum., 1817 = *Clava* Martyn, 1789. In adopting *Lotorium* Montf., for *Triton* (preoccupied), why retain the family name *Tritonidae*? For *Cypræa turdus* Lam., 1822, the name *C. ovata* Perry, 1811, is adopted, and for *Fusus turricula* Kiener, *F. forceps* Perry. *Latrunculus* Gray, is used instead of *Leburna* Lam., 1822 not 1801. The work is illustrated by four very finely executed plates containing 87 figures, and is by all odds the most important paper yet published on the faunæ of which it treats.

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NOTES ON ASHMUNELLA.

BY T. D. A. COCKERELL AND MARY COOPER.

A large series of specimens from Manzanares Valley and Cañon Diablo, near Rowe, N. M., shows that the *A. thomsoniana* type is well divided into two races, to which the names *thomsoniana* and *porteræ* are applicable. The Manzanares Valley specimens are to be designated *porteræ*, although the basal tooth is in most cases scarcely double, the inner denticle being reduced to a slight callosity. The Cañon Diablo form, coming from a somewhat higher altitude, is referred to *thomsoniana*, although the basal tooth is often double as in *porteræ*. The fact is, that the character of the basal tooth, whether double or single, is highly variable, and not to be relied on to separate races. On the other hand, the size is much more distinctive. The following measurements of the greatest diameter of the shell are worth giving:

(1) *A. thomsoniana* from Cañon Diablo. 9 are between 11 and 12 mm., 49 are 12, 52 are 12+, 53 are 13, 9 are 13+, 1 is 14, and 1 is 14½ mm.

(2) *A. porteræ* from Manzanares Valley. 1 is 13+, 3 are 14, 13 are 14+, 16 are 15, 10 are 15+, 5 are 16, 6 are 16+, 1 is 18 mm.

(3) *A. porteræ* from Beulah. 2 are 14, 12 are 14+, 17 are 15, 6 are 15+, 3 are 16 mm.

If any one will take the trouble to plot out the curves from these statistics, they will find that two and three are the same, with the mode at 15, and the skew towards the smaller size. On the other hand, one will be found to have an utterly different curve, with the

mode at 13, the skew strongly towards the smaller size, and the extreme of large size barely overlapping the minimum size of *porteræ*.*

A few of the Cañon Diablo *thomsoniana* have the mouth of the shell very strongly contracted, so as to look like a distinct species, but they are connected by intermediates with the ordinary form.

Albinos have been found of both forms:

A. thomsoniana mut. *alba*, nov. Cañon Diablo, N. M., one.

A. porteræ mut. *alba*, nov. Manzanares Valley, N. M., a few.

At the monthly meeting of the Las Vegas Science Club, held November 12, reported in *Science* December 27, 1901, p. 1009, the authors exhibited a series of a supposed new species of *Ashmunella*, "proposed to be called *Ashmunella antiqua*, found fossil in the Pleistocene beds of Las Vegas, N. M. It resembled in most respects *A. thomsoniana*, but wholly lacked the parietal tooth." Upon further examination it appears that the parietal callus has scaled off in the specimens described, and it is likely that the shells are identical with the living *A. porteræ*.†

COLLECTING SHELLS IN MONTANA.

BY MORTON J. ELROD, UNIV. OF MONTANA.

[*Continued from page 104.*]

Limnæa stagnalis L., var. *appressa* Say.

The first shells of this species were taken early in the year 1900 in a small pool along the Bitter Root river. A large spring supplies the pool with clear, fresh water. In this pond a good series of both living and dead shells was secured. A couple of dead shells were found in Swan Lake in August, 1900. This is over a hundred miles to the north of the Bitter Root locality, while water connection between the two places would be much more than double the distance.

A. porteræ was taken the past summer at the head of Dailey Cañon, in the uppermost part of the Canadian Zone. The specimen is quite like the Beulah ones.

† A co-type of *A. antiqua*, received from Mr. Cockerell, bears out this conclusion. It is without doubt *A. t. porteræ*. The passage quoted above from *Science* is the complete original account of *antiqua*.—Ed.

Limnæa palustris Müll.

Taken from a pond near Bitter Root river. Quite abundant, several hundred specimens taken. Also taken in abundance in standing and quiet waters in the creeks on Flathead Indian reservation. At the upper end of Flathead Lake there is a great deal of marshy country tributary to the lake and to Flathead river. In the lowland bordering on the lake, which had been overflowed and later dried off, large quantities of dead shells were observed. Indeed the shells were so abundant one could not walk without mashing large numbers. In still other places the shells were yet alive in the sloughs, in great abundance. Along the Bitter Root river the shells were living in the same waters with *Aplexa hypnorum*. Mr. Earl Douglass collected a large series in the Madison lakes, southern part of the State, in summer of 1900.

Limnæa nuttalliana Lea.

Abundant in the region with L. stagnalis L., var. appressa Say, L. palustris Müll., and P. trivolvis Say. A hundred or more specimens secured.

Limnæa emarginata Say, var. *montana* Elrod.

Shell large, globose, thin and fragile; of a light horn color, in many cases tending to light pearl gray; in many instances there is an abrupt line between the lighter portion and the horn colored portion, the lighter portion being next the aperture; the last whorl constituting about three-fourths the length of the shell; malleations obscure or absent, distinguishable in occasional specimens; lines of growth fine, and quite regular; spire short, consisting of three obliquely twisted whorls and the nucleus; suture well impressed; aperture about two-thirds as long as wide; outer lip thin, acute, inner lip reflexed near its junction with the columella.

Length 27 mm. Greatest width 13.25 mm. Width of aperture 10.25 mm. Length of aperture 14.70 mm. Whorls, 5.

The species is found sparingly in Sin-yale-a-min lake in the Mission range of western Montana, and abundantly in McDonald lake, some 15 miles north of the former. A few were taken in Swan lake, on the opposite side of the range. At Sin-yale-a-min lake an entire afternoon was spent in securing a couple of dozen specimens. The method was to row over to the lake outlet in the canvas boat,

secure location where the water was not too deep, and fish with a silk butterfly net attached to a long handle. When a shell was sighted the boat was brought to a standstill so the surface would become quiet, and the net was lowered with the edge of the wire beneath the shell. As soon as the shell was touched the animal let go all hold, and if it did not roll into the folds of the net would settle among the large pebbles. To secure it then in three or four feet of water was impossible. Naturally, the failures were as frequent as the successes. As stated, the afternoon produced a couple of dozen shells, two dripping individuals, each with aching backs and weary eyes, and a torn net and wet boat.

Aplexa hypnorum L., var. *tryoni* Currier.

The Bitter Root river valley flows to the north along the flank of the Bitter Root mountains, which are on the western bank. From these mountains numerous creeks enter the river, and many ponds have been made by these creeks and by the changing river. the river is about 100 miles long, and flows through one of the finest and most fertile valleys in the State. In one of these ponds, near the juncture of the Bitter Root and Missoula, this species was found rather abundantly.

Physa heterostropha Say (?).

Specimens referred by Dall to this species were collected at Missoula in June, 1898, September 17, 1897, and April 8, 1900, on which latter date they were depositing eggs. In working over the *Physa* collected in Western Montana, I have read with much interest the complaint of O. A. Crandall in THE NAUTILUS for June, 1892, in which he raises the question, "Is there such as species as that described by Say? If so, what is it?"

Physa ampullacea Gld.

The species seems widely distributed in Western Montana. It has been taken in Bitter Root river, in Lakes Sin-yale-a-min and McDonald in the Mission mountains, and sparingly in Flathead lake.

Physa gyrina Say.

A few of this species taken with *P. heterostropha* and *P. ampullacea*. Finding these three species together leads to suspicion that the species may not be distinct. A single shell from the Flathead Indian reserve (Crow creek) seems to belong to this species.

THE SHELL-BEARING MOLLUSCA OF RHODE ISLAND.

BY HORACE F. CARPENTER.

[*Continued.*]

Genus Pecten Brug. 1789.

The pectens, fan-shells or scallops have on each side of the beaks a broad expansion of shell called ears; beaks touching; hinge toothless, with a triangular pit for the cartilage. The animal has no syphons; the mantle is free, its margins double, the inner one fringed and hanging down like a curtain, and the outer one with a row of dots shown to be eyes. They move about very rapidly by suddenly opening and shutting their valves, and can jump two or three feet; they seem to have the power of choosing the direction, for they can, by a sudden jerk, jump backwards or to either side, skip along the surface of the water or sink to the bottom. I never saw one jump forwards. We have in New England three species, two of which inhabit Rhode Island.

208. *Pecten irradians* Lam.

Syn.: *Pecten concentricus* Say, Con., DeKay, Gld.

Shell nearly round; valves convex, with about twenty elevated, rounded ribs radiating from the beaks, the ribs and spaces between of nearly equal breadth; ears nearly equal; interior shining; on the exterior the ribs and spaces are both rounded while on the interior the corresponding spaces are flat. Length three inches, height two and a half, breadth one. The so-called eyes in this species, of which there are from forty to sixty, situated along the edges of the mantle in both valves, are of a beautiful bright-blue color. This is the common scallop and is a very abundant shell in Rhode Island, but owing to the great demand for this luscious bivalve in the market, the State of Rhode Island has passed laws prohibiting their being taken through the summer months of each year. The "scallop law" is off on the first day of September, and on the morning of that day hundreds of boats may be seen in our waters at sunrise eager to be first on the grounds where the scallop beds are. Thousands upon thousands of bushels of pectens are dredged during the following three or four months, and if it were not for the law allowing the young a chance to get their growth, one season would completely exhaust the supply. The entire animal is not used for food, like the

other edible species of mollusca, such as clams, quohogs, mussels and oysters, but only the large muscle in the centre which holds the valves together; this muscle in adult pectens is about an inch in diameter and the same in length. The shells are subject to great variety in color, sometimes having one valve pure white and the other yellow, red, purple, or mottled and banded with several colors, when young; the adult shells generally lose their brilliant shades and become of a uniform slate tint, with one valve, however, always lighter than the other. The young shells frequent the shore and are very active; I have often put out my hand to take one, when just as I almost had it, it would suddenly shut its valves and skip away out of reach. At times I have seen them at Apponang so abundant that they were piled up in layers six or eight inches deep, and at other times not one could be seen. The adults inhabit deeper waters and are dredged from the bottom from boats.

209. *Pecten tenuicostatus* Migh. and Ad.

Syn.: *Pecten magellanicus* Con., Gld., Stimp, DeKay.

Shell large, round, inequivalve, lower one nearly flat, upper one convex, ears nearly equal; surface with fine radiating, punctured lines; lower valve white; upper valve brownish-red, dingy; interior white, glossy and smooth, with a different set of radiating lines from those on the exterior. Length five inches, height five and a half, breadth one and a half.

This is a northern species, found of large size on the coast of Maine and everywhere north of Cape Cod; smaller ones are obtained from the stomachs of fishes. It inhabits deep water off Block Island, and in southerly storms is driven up in large numbers on the shore at Point Judith.

Family Anomiidæ.

Shells thin, pearly, with a notch or hole through the right or lower valve near the beaks, to which is attached a plug, closing the orifice and also serves to attach the shell to other objects. There are two genera, Placunanomia and Anomia, divided into several subgenera.

Genus Anomia, Linné., 1767.

The animal of *Anomia* differs from *Ostrea* in having a small foot, one of the peculiar characteristics of oysters being the entire absence of any foot.

The shells of *Anomia* have one valve convex and the other flat or a little concave ; the flat valve is perforated and the plug which fills the hole and partly attached to the valve. The shells are seldom found free but generally attached to oysters or other shells or stones. There are twenty species, two of which inhabit New England.

(*To be continued.*)

DESCRIPTION OF A NEW UNIO FROM TENNESSEE.

BY WM. A. MARSH, ALEDO, ILLINOIS.

QUADRULA ANDREWSII, n. sp. Shell smooth, triangular, solid, beaks swollen, incurved, shell very inequilateral, compressed and striate at the base, obliquely rounded before, obtusely biangular behind, ligament rather short, light brown, epidermis reddish brown, maculate, growth lines numerous, rather rough, umbonal slope slightly rounded, posterior slope flat, cordate, with very indistinct lines from beaks to basal margin, beak sculpture unknown, cardinal teeth thick, very much sulcate, single in right, double in left valve, lateral teeth thick, short, and slightly curved, anterior cicatrices small and deep, posterior cicatrices distinct, small and deep, shell cavity rather deep, cavity of the beaks deep and angular, nacre silver white and iridescent.

Diameter 1.1 ; length 1.6 ; breadth 2.

Habitat : Holston river, Tenn., Mrs. Geo. Andrews.

Remarks : Several years ago Mrs. Geo. Andrews, of Knoxville, Tennessee, sent me a number of these shells. I never knew where to place them, but recently, on sending some of them to Mr. Simpson for examination, I was satisfied they were distinct. They belong to the group of which trigonus, Lea, is the type, but in no way do they resemble that species. There is no species which they closely resemble, except globatus, Lea, but it is a very much less inflated shell than that species, having a different colored epidermis, rougher and coarser growth lines, at least one-half of the disk is covered with wide, dark green spots ; between these rows of maculations are very narrow, dark green interrupted rays.

The outline of globatus is rounded, while my shell is triangular.

I name this very interesting species in honor of Mrs. Geo. Andrews, a lady who has sent me very many interesting shells from Holston river, Tennessee.

NOTICES OF NEW JAPANESE LAND SHELLS.

BY H. A. PILSBRY.

Chloritis perpunctatus n. sp. Shell resembling *C. fragilis* in shape and general appearance, but differing in the very narrow umbilicus, half covered by the dilated columellar margin of the otherwise simple peristome, and by the extremely dense covering of exceedingly short hairs, almost exactly as in *C. pumila* Gude, which differs from *C. perpunctatus* in being imperforate, with a higher spire. Whorls 4, the inner ones flatly coiled, the last slightly and slowly descending. Aperture slightly oblique, broadly lunate. Alt. 8, diam. 13.7 mm. Totsugawa, Yamato, with *C. fragilis* (Mr. Y. Hirase, no. 843).

Ganesella sororcula n. sp. Shell narrowly umbilicate, globose-conic; white (fossil), encircled with scarlet bands above and below the periphery, with others variable in occurrence at the suture and within the umbilicus. Smoothish, lightly marked with irregular growth-wrinkles and densely, minutely engraved with spiral striæ. Spire conic, with slightly convex outlines, the apex very obtuse. Whorls $5\frac{1}{2}$, quite convex, the last more or less angular at the periphery, hardly descending in front, moderately convex beneath. Aperture oblique, the outer lip expanded, basal lip narrowly reflexed, columella subvertical, nearly straight, with reflexed, dilated margin.

Alt. 19.5, diam. 20.5 mm. Alt. 17.5, diam. 19 mm.

Kikai-ga-shima, Osumi (Mr. Y. Hirase, no. 834).

This species is closely allied to *G. Largillierti*, of Great Riukiu, and *G. Adelinæ*, of Oshima. It is smaller and less conic than either. *G. Adelinæ* has a larger umbilicus, a peripheral band and more whorls. *G. Largillierti*, besides being larger and more conic, wants the crowded spiral lines. It is found fossil with various other land shells, some of which I have already noticed elsewhere.

Ganesella optima n. sp. Shell obliquely perforate, elevated, pyramidal, thin, pale-yellow corneous, whitish above, glossy; lightly marked with oblique growth-wrinkles; faintly, almost imperceptibly striate spirally, but marked with minute whitish lines giving the appearance of spiral striation. Spire straightly pyramidal. Whorls

$7\frac{1}{2}$, slightly convex, the last slightly angular at the periphery in front, a little descending to the aperture, convex beneath, Aperture oblique, the peristome thin, everywhere arcuate, narrowly expanded and reflexed, triangularly dilated at the columellar insertion. Alt. $14\frac{1}{2}$ to $15\frac{1}{2}$, diam. $10\frac{1}{2}$ mm.

Suimura, Prov. Awa. Shikoku Island (Mr. Y. Hirase, no. 824.)

A charming species, unlike any other Japanese *Ganesella* in its elevated shape.

Macrochlamys cerasina n. sp. Shell perforate, depressed, with low-conic spire, dark-reddish amber colored, brilliantly glossy, with faint growth-lines, no spiral striæ. Whorls $5\frac{1}{2}$, convex, slowly increasing, separated by impressed sutures, the last whorl perceptibly angular at the periphery in front, convex beneath. Aperture slightly oblique, lunate, the lip simple and thin, abruptly dilated and reflexed in a minute triangle at the columellar insertion. Alt. 5.7, diam. 8.6 mm.

Tobishima, Prov. Ugo (Mr. Y. Hirase, no. 838).

M. cerasina var. *awaensis* n. v. Shell paler, with lower spire and 6 more closely coiled whorls. Alt. 4.2, diam. 7.8 mm.

Tairiuji, Awa, Shikoku Island. Although remote from the preceding geographically, this form seems to me to be too similar for specific separation.

Eulota (*Cœlorus*) *caviconus* n. sp. Shell small, thin, with a large, deep umbilicus, conic above, flattened beneath, reddish-brown, lustreless, the surface roughened by short cuticular processes like adnate hairs, usually in part worn off. Outlines of spire a little convex, the apex obtuse. Whorls about $7\frac{1}{2}$, the earlier a little convex, the later ones flattened ; the last whorl acutely carinate at the periphery, abruptly and deeply descending in front, contracted behind the lip. Aperture small, subhorizontal, oblong, the peristome expanded above, reflexed below, the ends approaching. Alt. 4, diam. $6\frac{1}{2}$ mm.

Goto, Uzen (Mr. Y. Hirase, no. 815).

This peculiar species is related to *E. cavicollis* Pils , differing in the flattened whorls and carinate periphery.

Mandarina exoptata n. sp. Shell narrowly umbilicate, depressed, biconvex, solid, light brown, the early whorls darker. Surface beautifully sculptured with crowded, spirally engraved, crimped lines, cutting irregular growth-wrinkles, the spirals obsolete immediately around the umbilicus. Spire low conic. Whorls $4\frac{1}{2}$, the first $1\frac{3}{4}$ or

2 forming the large nepionic shell. Last whorl wide, strongly carinate, a little sunken above and below the median keel, scarcely descending in front, convex beneath. Aperture oblique, wide, the lip obtuse, expanded above and outwardly, reflexed and thickened below. Alt. 14 to 15½, diam. 23 mm.

Hahajima, Ogasawara (Mr. Y. Hirase, no. 805).

An exceedingly distinct species, like a thick *Plectotropis*. It is quite unlike the larger carinate species *Mandarina Pallasiana*.

Microcystina hahajimana n. sp. Shell very minutely perforate or closed, depressed subglobose. Amber colored, translucent, brilliantly glossy, smooth except for some very slight growth-wrinkles. Spire quite convex. Whorls 5, nearly flat, the sutures but lightly impressed, narrowly margined. Last whorl faintly angular in front, convex beneath, impressed in the center. Aperture lunate, the peristome simple and acute; columella thickened above and bluntly toothed. Alt. 4, diam. 6½ mm.

Hahajima, Ogasawara (Bonin Islands). No. 803 of Mr. Hirase's collection.

Genus Hirasea *nov.*

Small disc-shaped or biconvex, perforate shells, pale and of nearly uniform tint, finely rib-striate, the aperture crescentic, the peristome contracted, thickened with a very heavy callus rib within. Type *Hirasea sinuosa*.

This genus belongs apparently to the *Zonitidæ*, or possibly to the *Endodontidæ*. It has some resemblance in the thick lip-rib to *Brazieria* or *Microphysura*, but there is no parietal barrier. The Philippine groups *Pliotropis* and *Glyptoconus* have some similar characters, but they are thin shells with no lip-rib. The species now known may be distinguished as follows:

a. Upper margin of the lip drawn back, the basal margin projecting beyond it. Spire low, composed of 5¾ very narrow and convex whorls, the last angular at the shoulder, very convex beneath, perforate; aperture narrowly crescentic; lip expanded and arched forward in the middle below, retracted at the upper termination. Alt. 2.1, diam. 4.3 mm. Hahajima, Ogasawara (Hirase, no. 802). *H. sinuosa*, n. sp.

*a*¹. Aperture normally oblique, the upper margin projecting forward; form biconvex. Whorls 4¾, with an acute, com-

pressed keel along sutures and at the periphery; subperforate; aperture lunar, oblique, a little contracted; finely rib-striate above and below. Alt. 2, diam. 4 mm. Hahajima (Hirase, no. 801). *H. nesiotica*, n. sp.

A third form was sent from Chichijima, Ogasawara (no. 800), similar to *H. nesiotica*, but much smaller, diam. 3.2 mm., with barely 4 whorls. This may be called *H. chichijimana*. Subsequently some five additional new species from Hahajima have been received.

GENERAL NOTES.

Helix aspersa Increasing in California.—Complaints are being made that the spotted snail, *Helix aspersa*, is becoming too common in the gardens of San José, Oakland and Los Angeles, California, and that it is injuring many flowers and vegetables. This species was introduced into California from Europe many years ago, presumably by a Frenchman who considered it a choice delicacy for his table. For a long time the snails were confined to a small plot of ground in the city of San José, but of late they have evidently resolved upon a "policy of expansion," and are spreading rapidly and are liable to cause serious mischief. It is to be hoped that Californians will cultivate the French taste and thus turn the tables on the molluscan invaders.—Josiah Keep.

Truncatella subcylindrica Linnæus.

This species has been credited to the West Indies by various writers, even to the present time, although Linnæus and all the early English authors gave it as a species of Europe. Dall and Simpson, in their Mollusca of Porto Rico, 1901, Bull. Fish Commission, p. 436, give its range as "Porto Rico; adventitious in England; common in Florida and many localities in the West Indies."

The Linnæan species is in fact a common European shell, occurring as far north as England; thinner, more transparent, and typically smoother, than any Antillean *Truncatella*. It is commonly found in older collections under the name *T. montagui*, and is probably not specifically distinct from *T. truncatula* Drap. The "*T. subcylindrica* Gray" of Binney's Terr. Moll. iv, and Land and F. W.

Shells of N. A., pt. iii, p. 100, is a totally different thing, and as the name is preoccupied, it must be dropped for the ribbed species there defined. If *T. subcylindrica* L. occurs at all in the West Indian area or Florida, *which I strongly doubt*, its presence there is "adventitious." All of which may be readily verified by a reference to the works of Linnæus, Hanley, Thorpe, and a collection containing a series of European *Truncatellidæ*.—*H. A. Pilsbry.*

The collection of the late Dr. Wm. D. Hartman has been purchased by the Carnegie Museum, Pittsburgh. It is especially rich in the genera *Partula* and *Helicina*, the Melanians, both American and exotic, *Unionidæ*, and Polynesian marine shells. It contains most of the types of new species described by Dr. Hartman, others being in the collection of the Academy of Natural Sciences. The *Achatinellidæ* were purchased some years ago by the Hamburg Museum. In acquiring this collection the trustees of the Carnegie Institute have made an extremely important addition to their museum, as the formation and study of this collection was the life-long work of Dr. Hartman. The specimens are well identified, as we know by frequent use of them, and afford a solid basis for conchologic work to students in Pittsburgh and the adjacent cities of Pennsylvania and Ohio.

Tamiosoma Conrad, a Sessile Cirripede.—Prof. W. H. Dall has recently examined specimens of this problematic fossil, formerly supposed to be molluscan, and finds that the supposed tubes are the vesicular, elongated bases of a *Balanus*-like cirripede.—*Science*, Jan. 3, 1902.

Planorbis bicarinatus striatus n. var.—Shell similar to that of typical *bicarinatus*, but with a deeper, narrower umbilicus, and with the spiral lines raised, very numerous and distinct, and with the longitudinal sculpture almost obsolete. Diameter 10, altitude of aperture 6 mill.

From sewer excavation, eight feet below the surface of the ground, Cold Spring Park, Milwaukee, Wisconsin, collected by Charles E. Brown.

This pleistocene fossil, of which no living examples have yet been seen, seems to differ from the typical *bicarinatus* sufficiently for varietal distinction. Twelve specimens have been examined, which are all uniform with the above description, and which are readily distinguishable from typical *bicarinatus*.—Frank Collins Baker.

THE NAUTILUS.

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A REVISION OF THE CARINATE VALVATAS OF THE UNITED STATES.

BY BRYANT WALKER.

Valvata tricarinata was originally described by Say in 1817 as *Cyclostoma tricarinata.* It is one of the most abundant of the smaller operculates of the Northern States and Canada, ranging from the Atlantic coast westwardly at least as far as Manitoba and Iowa, and south to Virginia and the Ohio river. It has three well-marked varieties, which differ from the typical form only in the smaller number or entire absence of the revolving carinæ.

In 1841 Dr. Isaac Lea described a *Valvata* from the Schuylkill river, Pa., as *V. bicarinata.*

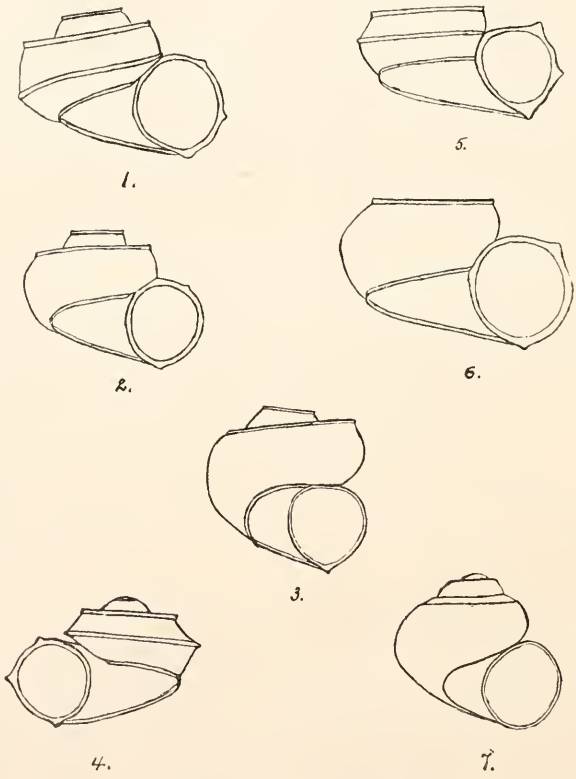
Haldeman in his "Monograph" (145) doubtfully refers Lea's species to *V. tricarinata* as a bicarinate variety. W. G. Binney, in 1865 (L. & F. W. Shells III, p. 9), states that from an examination of both Say's and Lea's types he is "convinced of the identity of the two." Tryon in his Continuation of Haldeman (1870) does not mention the subject, and evidently acquiesced in Binney's decision.

In this he has been followed by all subsequent writers so far as I have been able to ascertain, with one exception. Mr. W. A. Marsh in his "Brief Notes on the Land and Fresh Water Shells of Mercer Co., Ill." (Conchologists' Exchange II, p. 80, 1887), separated the two forms and recognized the validity of Lea's species.*

From a careful examination of the material in my possession I am

*The validity of *V. bicarinata* has been recognized by all recent Philadelphian conchologists. See NAUTILUS, VIII, p. 138.—ED.

convinced that Lea's *bicarinata* is not the bicarinate form of Say's *tricarinata*, but is a distinct species, which also has a tricarinate form. I have the typical form of *V. bicarinata* from Columbia and Philadelphia, Pa., and Port Oram, N. J., and the tricarinate form from Muscatine, Ia., and Utica, Ill. Within the last few weeks I have had occasion to examine critically hundreds of specimens of *V.*



tricarinata in its various aspects from Michigan, and a considerable number from at least ten different states and Canada, and I have yet to see the first specimen that in any way seems to connect the two.

In comparison with *V. tricarinata*, Lea's species is larger, discoidal; the upper surface of the whorls slopes downwards from the carina to the suture, giving a concave appearance to the upper surface

as a whole; the spire is depressed, not appearing above the superior carina of the body whorl, the umbilicus is very wide and more shallow, exhibiting all the whorls. In *tricarinata*, on the other hand, the whorls are more closely coiled, making a round, deep, funnel-shaped umbilicus; the penultimate whorl is elevated and only the apex of the spire is depressed.

The relation between the two species is very similar to that between *Pyramidula perspectiva* Say, and *striatella* Anth.

The recognition of the specific distinctness of these forms not only involves some changes in nomenclature, but also renders necessary a re-description of the various recognized forms.

The following re-arrangement of the group is offered as an attempt to satisfactorily differentiate the different forms.

I. *Valvata tricarinata* Say (fig. 1).

Shell turbinate, thin, translucent, shining; horn-color or pale green; whorls about $3\frac{1}{2}$; flattened between the carinæ; shouldered; the upper surface sloping upwards from the carina to the suture; spire elevated, depressed at the apex; lines of growth faintly marked; suture distinct; body whorl tricarinate, superior carina revolving nearly to the apex, the peripheral carina on the whorls of the spire being usually covered by the lower whorl; carinæ sharp, elevated and lighter in color than the body of the shell; aperture circular, slightly modified, however, by the carinæ; lip simple, sharp, continuous, slightly appressed to the body whorl; umbilicus round, deep, funnel-shaped, bordered by the inferior carina. Height $3\frac{1}{2}$, width $5\frac{1}{2}$ mm.

Cyclostoma tricarinata Say, Jour. Phil. Acad. Nat. Sci., I, 13 (1817).

Canada and eastern United States to, at least, as far west as Manitoba and Iowa, and south to Virginia and the Ohio River. (Utah, Ingersoll.) As all gradations between the typical form and the different varieties can be found in any considerable suite of specimens; it is deemed best to draw the lines between the recognized varieties upon the presence or absence of well-developed carinæ. Angulations of the body whorl, however acute, should not be considered in determining the position of any particular specimen.

This species is one of the most abundant forms in the Post-Pleistocene deposits of Michigan, and apparently was then more

subject to variation than at the present time. In the NAUTILUS, XI, p. 121, will be found an account of several specimens in which an additional carina was developed. In a large amount of material from the marl deposits of the State recently examined, two examples were found in which the superior and peripheral carinæ are present, but the basal one is obsolete, while in a deformed specimen from the deposits at White Pond, N. J., only the basal one is present. Two specimens from Michigan marl deposits have the last whorl near the aperture, entirely separated from the body whorl. None of these variations have been noticed so far as I am aware in recent specimens. In the collection of the late Dr. Jas. Lewis, now in my possession, is a sinistral specimen (fig. 4).

As these variations occur only in very few instances, they are to be classed as individual variations or "sports," rather than as distinct forms worthy of varietal names.

Var. *confusa* n. v. (fig. 2). Body whorl bicarinate, peripheral carina obsolete; periphery rounded or angulate. *Valvata tricarinata* var. *bicarinata*, authors generally, not of Lea. A curious scalariform specimen is in the collection of Mr. J. H. Ferriss, of Joliet, Ill. (fig. 3).

Var. *unicarinata* DeKay. Unicarinate, peripheral and basal carinæ obsolete, periphery rounded, base rounded or angulate. *Valvata unicarinata* DeKay. N. Y. Moll., p. 118, pl. VI, f. 129 (1843).

Var. *simplex* Gld. Ecarinate, whorls usually more or less flattened above. *Valvata tricarinata* var. *simplex*, Gld., Invert Mass., p. 226, f. 126 (pars.), (1841).

The citations of *Valvata humeralis* Say from Michigan by Miles (Geo. Sur. Mich., p. 237, 1860) and from Canada by Bell, Whiteaves, etc., referred to by Binney (L. & F. W. Shells, III, p. 14), are in all probability based upon this form.

II. *Valvata bicarinata* Lea (fig. 6).

Shell discoidal, flattened above, rather thick, shining; horn-colored or tinged with green; whorls $3\frac{1}{2}$, shouldered, upper surface sloping downward from the carina to the suture, which is deeply impressed; spire greatly depressed, not rising above the carina of the body whorl when viewed from in front; lines of growth faintly marked; body whorl bicarinate, superior carina revolving nearly to the apex, periphery rounded or bluntly angulate; carinæ sharp,

elevated ; aperture nearly circular, slightly flattened above and modified by the carinæ ; lip simple, sharp, appressed to the lower half of the body whorl ; umbilicus wide, exhibiting all the whorls. Height $3\frac{1}{2}$, width $6\frac{1}{2}$ mm.

Valvata bicarinata Lea, P. A. P. S. II. 81, 83 (1841). Schuylkill river, Pa. (Lea), Columbia, Pa., Philadelphia, Pa., and Port Oram, N. J. (Walker), and Mercer Co., Ill. (Marsh).

The distinguishing characteristics of this species as compared with *V. tricarinata* have already been stated. The localities above mentioned are the only ones brought to my notice, but it will probably be found in the intermediate region.

Var. *normalis*, n. v. (fig. 5). Body whorl tricarinate, otherwise like the type. Muscatine, Ia. and Utica, Ill.

As in the case of *Polygyra andrewsæ* W. G. Binn., the typical form of this species is really only a variety of the real specific type. In a single specimen from Utica, Ill., collected by J. H. Ferriss, a fourth carina is developed on the upper surface of the last whorl at about its first third, and revolves parallel with the suture to the aperture, the space between forming a deep groove.

III. *Valvata utahensis* Call. (fig. 7).

Shell turbinate, thin, translucent, shining ; yellowish horn color at the apex, white or greenish white below ; whorls 4, convex, regularly increasing, minutely striate, the uppermost shouldered, with a single, well marked carina which becomes obsolete on the body whorl ; spire obtusely elevated, apex depressed ; suture well impressed ; aperture circular, slightly angled posteriorly ; lip simple, nearly continuous, appressed to the body whorl ; umbilicus small, round, defined by a more or less obvious angle around the base of the shell. Height $4\frac{1}{2}$, width $4\frac{1}{2}$ mm. Utah Lake and Bear Lake, Utah.

Valvata sincera v. *utahensis* Call, Bull. U. S. Geol. Sur., No. 11, p. 44, Pl. VI., f. 1–3 (1884). *Valvata utahensis* Call, Proc. Dav. Acad. Nat. Sci. V, p. 4, Pl. I, fig. 1–3 (1886).

This species, which is more nearly related to *V. tricarinata* var. *unicarinata* than to any other of the eastern forms of *Valvata*, is well characterized by its more elevated spire, more globose form, the obsolescence of the carinæ on the body whorl and the much smaller umbilicus.

PISIDIUM STRENGII, N. SP.

BY DR. V. STERKI.

Mussel of moderate size, regularly inflated, rather short; beaks slightly posterior, small, narrow, approximate, somewhat projecting over the hinge margin; superior and inferior margins well curved, the supero-anterior slightly so and forming a steep slope to the somewhat angled anterior end; the posterior end subtruncate; scutum and scutellum indistinct; angles in front of and behind the beaks slight, rounded; shell rather thin, translucent; surface very finely striate, appearing smooth, with a few fine, irregular lines of growth, and with a slight, dull gloss; color of epiconch pale horn shading into grayish, whitish or yellowish; nacre almost glassy, muscle scars very slight; hinge fine, plate narrow; cardinal teeth small, thin; the right one curved, its posterior end deeply cleft, the left anterior curved or almost straight, the posterior short, oblique; lateral teeth small, somewhat pointed, the outer ones of the right valve quite small but distinct; ligament small. Long. 4, alt. 3.7, diam. 2.6 mill. (average).

Hab.: Michigan to New York, Ohio and Indiana. It seems to be a form mainly inhabiting smaller lakes. Perch lake, Mich., collected by Mr. L. H. Streng (in whose honor the species is named) and Dr. Kirkland; Reed lake and Little Bostwick lake, Mich.; Bass lake, Ind. (among shells taken from the stomach of catfish), by Mr. L. E. Daniels; Meyer's lake, Ohio (Sterki); Little Lakes, N. Y., found among materials in the collection of the late Dr. Jas. Lewis, now in possession of Mr. Bryant Walker.

Pisidium strengii has a resemblance to some smaller forms of *P. abditum* Hald., *nov-eboracense* Pr., and with *politum* Sterki, but can be recognized by its high form, the small, approximate beaks, especially noticeable in front (or rear) aspect, the peculiar, dull gloss of the surface, and the strongly cleft posterior end of the right cardinal tooth. The latter feature was found constant in normal specimens from widely distant places; but it may be added that the species appears to be particularly inclined to abnormal, and even monstrous formation of the cardinal teeth. As to size, shape and general appearance, the mussel does not vary greatly, so far as seen.

This species was first noticed as different from others, and named, in 1895. Yet, considering the great variability of our Pisidia as well as the fact that it does not show a striking variance from others, in general appearance, it was thought best to wait until sufficient evidence was gained of its being really distinct.

NOTE ON THE NAMES ELACHISTA AND PLEUROTOMARIA.

BY W. H. DALL.

My attention has been called by Mr. Cockerell to the fact that the name *Elachista* Dall and Simpson, in the Porto Rico Report, Mollusca, p. 427, 1901, is preoccupied in Lepidoptera by Treitschke, since 1833. For this peculiar group of *Bittium*, typified by *B. cerithidioide* Dall, and which extends in time as far back as the Eocene in both Europe and America, I would substitute the name *Alabina*, in reference to its resemblance to *Alaba*, a name which, so far as I am able to discover, has not hitherto been used.

I have frequently called attention to the ill-effects of the absurd European proposition that names such as *Cyprinus* and *Cyprina* should not be allowed to exist in nomenclature simultaneously. Very few of those who support this view have any idea of the havoc in nomenclature which the rigid enforcement of such a rule would produce, with no benefit, but a very serious detriment to science. Finding the name *Nassaria* challenged on this ground, I hunted up the earlier use (1806) in Duméril's *Zoologie Analytique* and took the occasion to make a full list of Duméril's names, which all end in *arius* and are all synonyms. Some appear in the text and others in the Latin index only, with references to the pages where the French equivalent is to be found. Among the latter I discovered *Pleurotomarius*, Duméril's name for *Pleurotoma*. If the idiotic rule above-mentioned was put in force, this superfluous synonym would deprive us of the right to use *Pleurotomaria* J. Sowerby, which dates only from 1821, and perhaps also *Pleurotomarium* Blainville, another rendering of Defrance's French name, which dates from 1825. I may add that any rule admitting anonymous names, taken into consideration with the above-mentioned one, would upset about half of the best-known names in Molluscan Zoology, including such as *Oliva*, *Cypræa*, etc. Can any one mention any good results to be obtained from such a course?

THE ORIGINAL LOCALITY OF LIMNÆA AMPLA MIGHELS.

BY OLOF O. NYLANDER.

In 1842 Mr. Alexander W. Longfellow discovered in Second Eagle Lake *Limnæa ampla*. Prof. Edward L. Morse visited the same lake in 1851 and called it Mud Lake. On the maps of Maine it is generally called Second Lake, but Mud Lake is the only name

used among the people. It is located on the east branch of Fish river, between Long and Cross lakes, in Township XVII, Range 4, Aroostook county, Maine. Some parts of Fish river have been visited every summer since 1897, and the shells collected published at various times in the NAUTILUS. Mud Lake (Second Lake) being of special interest to conchologists, as *Limnæa ampla* was described from specimens found in this lake, I examined it for the first time in August and September of last year (1901).

The name *Limnæa ampla* is in use from Maine to Alaska by different collectors. The question arose at an early date if *L. ampla* really could be a distinct species or only a variety of some previously described form. The best authors agree it is only a variety of Say's *L. emarginata* (also described from Maine in 1821) and my observations go to confirm the same.

Mud Lake is about $2\frac{1}{2}$ miles long and one wide, shallow, with mud, gravelly and rocky bottom, the forest growing all around it down to the water's edge. There are no settlements upon the lake, and in all probability it looks just the same as when Mr. Longfellow first collected his shells in 1842. A paper privately published, 4 pp., 4 plates and 85 figs., illustrating the variation of *Limnæa emarginata* of Fish river, was prepared in Oct., 1901, and a more elaborate one will appear when all the lakes on Fish river have been examined and a map prepared.

A careful survey was made in every part of Mud Lake and collections made in all parts of it from the shore to 15 feet in depth, and the following species were obtained :

Physa ancillaria Say. A few thin, fragile shells, nearly as clear as glass, were dredged in 3 to 6 feet of water at the upper end of the lake on muddy bottom.

Limnæa emarginata Say. Very abundant at the inlet in all stages of growth. (The original locality of *Limnæa ampla* Mighels.) Smaller colonies were found in the upper part of the lake and on the left side of lake near the outlet.

Planorbis companulatus Say. Dredged.

Planorbis bicarinatus Say. Dredged.

Planorbis hirsutus Gld. Dredged in the lake and the thoroughfares above and below the lake; very variable.

Planorbis parvus Say.

Ancylus parallelus Hald. One specimen in thoroughfare below the lake.

Valvata tricarinata Say. One specimen.

Valvata sincera Say. One specimen in the lake and a few in the thoroughfare below the lake.

Amnicola limosa Say. Common.

Unio complanatus Sol. Common.

Margaritana undulata Say. Few dead shells at the inlet, and the thoroughfare between Long and Mud Lakes.

Anodonta fragilis Lam. Common (small forms).

Sphærium striatinum Lam. Living and dead shells abundant on rocky bottom in the thoroughfare between Mud and Cross Lakes.

Calyculina securis Prime. At the inlet not many found.

Pisidium pauperculum nylanderi Sterki. Few specimens.

Pisidium ferrugineum Prime. Few very fine specimens at the inlet.

Caribou, Maine, Feb., 1902.

COLLECTING SHELLS IN MONTANA.

BY MORTON J. ELROD, UNIV. OF MONTANA.

[*Continued from page 112.*]

Limax montanus Ingersoll. One specimen taken at Missoula, June 29, '97. Slugs are rarely seen in this region.

Euconulus fulvus Drap. A few specimens taken near Missoula, June 5, '97.

Succinea nuttalliana Lea. At the upper end of Flathead lake, in a swampy bog, quantities of *Limnoea palustris* Müll. with dark shells, were discovered. Among these was an occasional *Planorbis trivolvis* Say. Four specimens of *S. nuttalliana* Lea, were all that could be found, though diligent search was made. These delicate shells appear to be very scarce, since they have been taken no place else.

Polygyra devia Gld. var. *hemphilli* W. G. B. On May 8, 1900, Arbor Day, we took to the woods along the beautiful Lo Lo creek, south of Missoula, and extending up into the Bitter Root mountains a distance of some 75 miles. Lunch was eaten some four miles from the mouth of the creek, when we sought for specimens along the banks of the stream in overflowed pools. Among and in the abundant fresh deer-tracks were found scattered specimens of this species and *P. townsendiana* Lea, var. *ptychophora* A. D. Br. The species was not abundant, only about 15 being taken. They were much scattered, in holes, under decaying vegetation, difficult to discover.

Polygyra townsendiana Lea, var. *ptychophora* A. D. Br. These were taken rather abundantly, some 60 being the result of a two hours' search along the Lo Lo creek on May 8, 1900, in connection with *P. devia* Gld., var. *hemphilli* W. G. B. For details see under the latter species for information. Also found in small numbers at other places near Missoula. The species was also taken at both McDonald lake and Sin-yale-a-min lake in the Mission mountains, a couple of dozen being taken at the former place and but a few at the latter.

Zonitoides arboreus Say. A half dozen of these little shells taken at Missoula June 5, 1897.

Pyramidula striatella Anth. Only a very few of this species taken near Missoula in June, 1897.

Pyramidula elrodi Pils. This beautiful shell has been termed by an admiring friend "the queen of the Pyramidulas." It has thus far been found only along the banks of McDonald lake in the Mission mountains of Montana, living on the crags and among the loose talus. The first collecting produced some forty specimens, all dead. During the summer of 1900 about three quarts were secured. It will be interesting to the reader to give some of the opinions regarding this shell. For beauty the quotation above is certainly very flattering. W. G. Binney writes, Oct. 12, 1900, "I call it a depressed form of Hemphill's *Wasatchensis*. You might make a dozen species out of my series, and feel like tearing your hair afterwards in despair!" Dr. W. H. Dall says "the shell is larger than any *strigosa* I ever saw, and differs in sculpture from any in our collection. *Strigosa*, var. *Hemphilli* has the same form, but its sculpture is predominantly spiral and the shell the usual size. Conchologically speaking, it is a coarsely sculptured form of Stearns' shell (*circumcarinata*)." Dr. H. A. Pilsbry considers it sufficiently different from any existing species to be described as a distinct species.

THE SHELL-BEARING MOLLUSCA OF RHODE ISLAND.

BY HORACE F. CARPENTER.

[*Conclusion.*]

210. *Anomia aculeata*, Gmel.

Shell small, round; beaks obtuse, terminal; surface covered with fine hairy, radiating lines on the upper or convex valve; lower valve thin, smooth and flat, color yellowish white or gray; interior shining; aperture circular. Length and height about one-half inch each.

Habitat from Long Island to Greenland and northern coasts of Europe, rare south of Cape Cod. It has been found at Greenport and Montauk, L. I. (S. Smith); Stonington, Conn., 4 to 5 fathoms; Off Gay Head, 10 fathoms, but as yet no specimens have been obtained in R. I. waters. Its station is among roots of fuci, attached to stones and shells.

211. *Anomia glabra*, Verrill, 1872.

Syn: *Anomia ephippium*, Gld. and American authors, non Linné. *Anomia electrica*, Gld. (Binney's), non Linné. *Anomia squamula*, Gld. (young), non Linné.

Shell rounded, oval or irregular in form; beaks small, pointed, not quite reaching the margin; substance of the shell scaly, consisting of numerous overlapping layers of pearly material resembling talc, of a greenish tinge in living specimens—this substance in dead

shells is rubbed off, showing the golden and silvery hues of the real surface; upper valve convex, lower valve flat, with an ovate aperture which reaches the margin by a fissure. Diameter about one inch.

Habitat from Maine to Florida, but rare and local north of Cape Cod. It is sometimes very abundant in R. I. and at other times quite rare. Generally in the fall months it is seen adhering to small stones between tides at Opponang in Greenwich Bay, but during the rest of the year it is rare to find one near the shore, its station being among oyster beds. When growing upon the valves of *Pecten irradians*, as it does sometimes, the *Anomia* conforms to the shape of the Pecten and is ribbed like that species.

The *Anomia ephippium* of Linnæus is a very common European shell, and the great naturalist was deceived in our American shell, supposing it to be the same species, and called it by the same name, giving as its habitat, Pennsylvania. All authors since have known it under that name, even down to Dall's revision of the Mollusca of Mass., Mar. 16, 1870, but Prof. A. E. Verrill has shown it to be a distinct species and named it *Anomia glabra*, V., Am. Jour. Sci., iii, 213, 1872.

The shell described in Binney's Gould, second edition, under the name of *Anomia electrica*, Linné, is found among oysters and is distinguished from A. glabra by its sulphur yellow color, its defined edge and its very convex upper valve. It is generally distorted, semi-transparent and not so scaly as the preceding species. I think it is merely a variety, and the variety is much more common with us than the type.

Family *Ostreidæ*.

The oysters commenced in the Carboniferous and are found in every age since to the present time. Some of the fossil oysters are two feet in length. Of the living species, the most peculiar in its habitat is the tree oyster, which grows upon the roots of the mangrove. There is but one genus in this family and about 70 species.

212. *Ostrea borealis*, Lam.

Syn.: *Ostrea Canadensis*, Brug, Lam, Hanley.

213. *Ostrea Virginica*, Lam.

Syn.; *Ostrea Virginiana*, Lister, Sby, Gld.; *O. rostrata maxima*, Chem.; *O. elongata*, Solander.

These two species are so variable in shape that it is impossible to give an accurate description of them. They are very irregular and inequivalve, the larger valve generally attached to some object and the smaller one moving forward as the shell grows. *O. borealis* is obliquely rounded ovate, with short curved beaks, while *O. Virginica* is long and narrow, with long and pointed beaks. In both species the large valve is the lower one and the upper valve is the smallest, flatter and smoother; surface of borealis flaky, greenish, that of

Virginica somewhat lead color. Interior chalky or greenish white, with a dark violet muscular impression in the centre.

A. Virginica sometimes attains a length of twelve to fifteen inches, but seldom over three inches in breadth, while in *borealis* the breadth is about one-half the length; specimens six inches in length are about three in breadth.

Oysters have many enemies, among which are sponges, star-fish, drills and man. The drills or borers, *Urosalpinx cinerea*, are extremely abundant in our bay, and can destroy a great many oysters in a short time.

Ostrea edulis of Europe is considered by some authors to be identical with our northern oysters. I cannot see enough resemblance in either shell or animal to agree with them. Experienced oyster-eaters can tell the difference between *borealis* and *Virginica* instantly by the taste, having no knowledge whatever of the shells. Having tried to eat English, Scotch, French and Dutch oysters, judging from that standpoint I could never believe they were the same species as the *Ostrea borealis*, the finest eating oyster in the world.

[The following species were omitted in their proper place:]

175. *Pisidium variabile* Prime.

Shell heavy, oblique inequilateral, inflated, anterior longer, narrower and angulated at the end; beaks full, prominent, not approximating at the apex; valves solid, interior light blue; epidermis glossy, color variable, straw or greenish-brown, with a yellow zone on the basal margin; cardinal teeth united; lateral teeth short and strong. Length $\frac{21}{100}$, height $\frac{18}{100}$, breadth $\frac{17}{100}$ inch.

Described by Temple Prime in Proc. Bost. Soc. Nat. Hist., IV, 163, 1851. Inhabits the Eastern and Middle States. A very common species found in nearly all small streams.

176. *Pisidium Virginicum* Gmelin.

Shell thick, oblique, very inequilateral, coarse and robust in appearance; anterior rounded, posterior broader, subtruncated at the extremity, beaks large; valves solid, interior light-blue; epidermis greenish-brown to chestnut, with zones of a darker shade; hinge margin curved; cardinal teeth two, shaped like the letter V reversed; lateral teeth short and strong. Length $\frac{35}{100}$, height $\frac{29}{100}$, breadth $\frac{21}{100}$ inch.

This is one of the largest species of *Pisidium* in America. It inhabits running streams in New England and Canada, and throughout the Middle States, and in a few of the Western States. Say, in 1819, described this shell under the name of *Cyclas dubia*, and it is generally known to collectors under this name, but Mr. Prime has shown it to be identical with one deseribed by Gmelin, in 1788, as *Tellina Virginica;* he, therefore, changes the name to its present one as adopted above.

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E. G. Vanatta, del.

COLOMBIAN LAND SHELLS.

The Nautilus.

Vol. XV. APRIL, 1902. No. 12.

NEW LAND SHELLS FROM THE SANTA MARTA MOUNTAINS, COLOMBIA.

BY H. A. PILSBRY AND G. H. CLAPP.

The species described below were collected by Mr. and Mrs. Herbert H. Smith, in the course of their recent collecting tour in the Santa Marta region.* The country explored proved to be singularly unproductive in land mollusks, both species and individuals being, with the exception of a few forms, very scarce. However, the proportion of new forms was high, and indicates considerable local specialization, as would be expected from the topography of that portion of Colombia.

Glandina callista n. sp. Pl. vii, fig. 7.

Shell fusiform, very thin, pale brownish-yellow with a few indistinct darker streaks, more numerous on the spire, and encircled by numerous narrow, inconspicuous buff spiral lines between the periphery and suture and on the spire. Surface but slightly glossy, sculptured with fine, somewhat irregular striæ, and weakly scored by fine, close spiral striæ, better developed below. Suture distinctly margined with a row of small bead-like folds, each formed usually by the coalescence of two, or the knob-like enlargement of one of the striæ. Spire acuminate. Whorls nearly 7, but slightly convex, the last more inflated, tapering below. Aperture slightly oblique, four-

*The *Bulimulidæ* collected have been noticed in the current volume of the *Manual of Conchology*, two being there described as new. Two other species, *Pleurodonte clappi* and *Nenia smithæ*, have already been described and figured in this journal.

sevenths the length of the shell; outer lip evenly arcuate; columella very concave, truncate as usual below. Parietal wall covered with a very thin wash of callus, which swells broadly out upon the whorl in the middle, and is abruptly retracted above. Length 68.5, diam. 26 mm.; length of aperture 38, greatest width 15.5 mm.

Santa Marta Mts. at Valparaiso, in forest at 4500 ft. elevation.

A charming species, remarkable for its acuminate spire, fusiform contour and thin texture. It differs from *G. striata* by its sculpture and the absence of distinct dark varices. *G. plicatula* is a smoother, more obese shell, with shorter aperture. No other South American species is nearly related.

Circinaria ponsonbyi n. sp. Plate vii, figs. 1, 2, 3.

Shell much depressed, flat above, broadly and openly umbilicate, thin, slightly greenish yellow-corneous, with a few faint darker streaks; subtransparent. Surface glossy, irregularly sculptured with wrinkles of growth. Spire almost perfectly flat, the inner whorls hardly perceptibly raised. Whorls a trifle over 5, convex, separated by a deeply impressed, narrowly margined suture, the last whorl wide, evenly rounded at the periphery, convex beneath. Umbilicus about one-fourth the shell's diameter, regularly narrowing, all the whorls being plainly visible. Aperture somewhat oblique, lunate-oval. Peristome simple and thin, the upper termination inserted far above the periphery of the preceding whorl. Alt. 4.9, diam. 13 mm.

Santa Marta Mts. at Cacaguelito, 1500 ft. elevation, under dead leaves.

It is named for our valued friend and correspondent John Ponsonby, of London.

A paler and slightly less depressed form, which may be called *C. ponsonbyi clara*, was taken at El Libano, at 6000 ft. elevation. It is pellucid, faintly greenish-corneous—the largest specimen measuring, alt. 5, diam. 12 mm., whorls $4\frac{1}{2}$. The whorls are somewhat more convex beneath, and the apex is larger.

Aperostoma sanctæmarthæ n. sp. Plate vii, figs. 9, 10.

Shell openly umbilicate, depressed, rich chestnut colored with some yellowish streaks and darker lines at irregular intervals; moderately solid. Surface glossy, sculptured throughout with close, fine, rib-striæ, which are distinctly wavy or crimped, and occasion-

ally anastomosing or splitting. Whorls $4\frac{1}{3}$, convex, tubular, rapidly enlarging, the last becoming almost free from the preceding near its termination. Aperture but slightly oblique, subcircular, a little angular above. Peristome obtuse, continuous, a trifle excised and retracted on the parietal margin. Umbilicus ample, showing all the whorls, its width contained $4\frac{1}{2}$ times in that of the shell. Alt. 20, diam. 31.5 mm. Length of aperture with peristome 14.5, width 14.3 mm.

Operculum solid, perfectly flat, dull and white externally, composed of about 7 whorls, which are raised in a low ridge or welt on the inner edge, and very obliquely striated, the nucleus a little sunken, and not raised inside. Diam. 12 mm.

Las Nubes estate, Santa Marta Mts., Colombia, at 4000 ft. elev. A single specimen.

Related to *A. popayanum*, but the umbilicus is wider, the striæ stronger, and with another color-pattern. A close examination shows some very faint traces of spiral bands.

Aperostoma smithi n. sp. Pl. vii, figs. 5, 8.

Shell rather narrowly, deeply umbilicate, low-turbinate, very dark chestnut with indistinct wide, black streaks, the eroded inner whorls dull red; moderately solid. Surface glossy, with sculpture of close rib-striæ, which are a little waved or crimped. Whorls fully 4, convex, rapidly widening. Aperture large, moderately oblique, circular, a trifle angular above. Peristome blunt, continuous, in contact with the preceding whorl for a short distance only. Umbilicus deep, its diameter contained 9 or 10 times in that of the shell.

Alt. 14, diam. 20 mm.; length of aperture 10.5, width 10 mm.

Alt. 14.5, diam. 19.5 mm.; length of aperture 10.8, width 10 mm. Operculum whitish externally, composed of about 6 flat whorls around a sunken, corneous nucleus about 1 mm. diam. Internally there is a slight central mucro, which lies just within the edge of the dull scar of attachment. Diam. 9 mm.

Santa Marta Mts. at El Libano, at 6500 ft. elevation, under decaying leaves in forest.

It is about the size of *A. dysoni*, but with stronger, straighter rib-striæ and slightly more oblique aperture. *A. pazi* Crosse is somewhat similar, but has a wider umbilicus, smaller aperture and is more depressed. *A. smithi* has a much smaller umbilicus than *A. sanctæ*

marthæ at any stage of growth; the aperture is larger and more oblique, the color is darker, and the operculum differs. This species is respectfully dedicated to Mr. H. H. Smith.

Helicina sanctæmarthæ n. sp. Pl. vii, fig. 4.

Shell globose-conic, rather thin; variously colored, yellow, corneous-yellow or light red above, paler beneath, variegated with more opaque white or whitish in spiral lines and bands, continuous or interrupted; the suture generally having a dark red border above, apex white or tinted. Surface somewhat glossy, nearly smooth to the eye, but sculptured with fine growth-lines and sparse, unequal and irregularly spaced spiral lines of punctures. Spire straightly conic, rather acute. Whorls $4\frac{3}{4}$ to 5, somewhat convex, the last rounded at the periphery. Aperture oblique, semicircular; lip thin, expanded and reflexed, pale yellow. Basal callus spreading far forward, whitish in the middle, elsewhere transparent.

Alt. 11.5, diam. 13 mm.

Alt. 11, diam. 13.5 mm.

Operculum bluish-white with some darker concentric lines, concave and minutely papillose outside, the papillæ not crowded. Interior glossy blackish, shading to red and then yellowish towards the nucleus, a reddish border at the semicircular periphery. Straight margin yellow-bordered, strengthened by a moderate ridge, which is bent inward near the nucleus.

Santa Marta Mts., Colombia, at El Libano, 6000 ft. elevation, on trees, especially palm leaves.

This species closely resembles *H. columbiana* Phil. at first sight, but it has a more straightly conic spire and entirely different minute sculpture, *H. columbiana* being decussated with crowded spiral lines crossing the growth striæ. The operculum in *H. sanctæmarthæ* is thicker than in *H. columbiana*, and of a different color outside, but the internal structure and color are about the same.

Helicina cacaguelita n. sp. Pl. vii, fig. 6.

Shell globose-conic, thin, pale yellow or reddish-corneous, with the spire pale red, the suture margined with red above, last whorl encircled with several opaque whitish bands or lines. Surface nearly smooth, showing faint growth-lines and almost obsolete spirals under a lens. Spire straightly conic, rather acute. Whorls $4\frac{1}{2}$, somewhat convex, the last rounded peripherally. Aperture oblique and semi-

circular. Outer lip very narrowly reflexed, whitish, a little thickened within. Basal callus moderately spreading, whitish in the middle, elsewhere transparent.

Alt. 7.8, diam. 9.5 mm.

Alt. 7.2, diam. 8.3 mm.

Operculum thin, externally whitish at the nucleus and along the straight margin, a red area around the nucleus, outside of which it becomes pale blue, with a reddish bordering line; nearly smooth. Inside deep reddish, almost black, fading to whitish along the straight margin and near the nucleus. The straight edge is thickened outside and within.

Santa Marta Mts., Colombia, at Cacaguelito, at 1500 ft. elevation, on the ground in forest under decaying leaves.

A small edition of *H. sanctæmarthæ*, but differing in the less extensive basal callus, the minute sculpture, narrow lip, thinner shell and operculum. It is more globose than *H. tamsiana*. The coloring is similar in some specimens of *H. nemoralina* of Trinidad, but that shell has a more globular last whorl.

NOTES ON THE DISTRIBUTION OF THE PLEURODONTE ACUTA GROUP.

BY P. W. JARVIS.

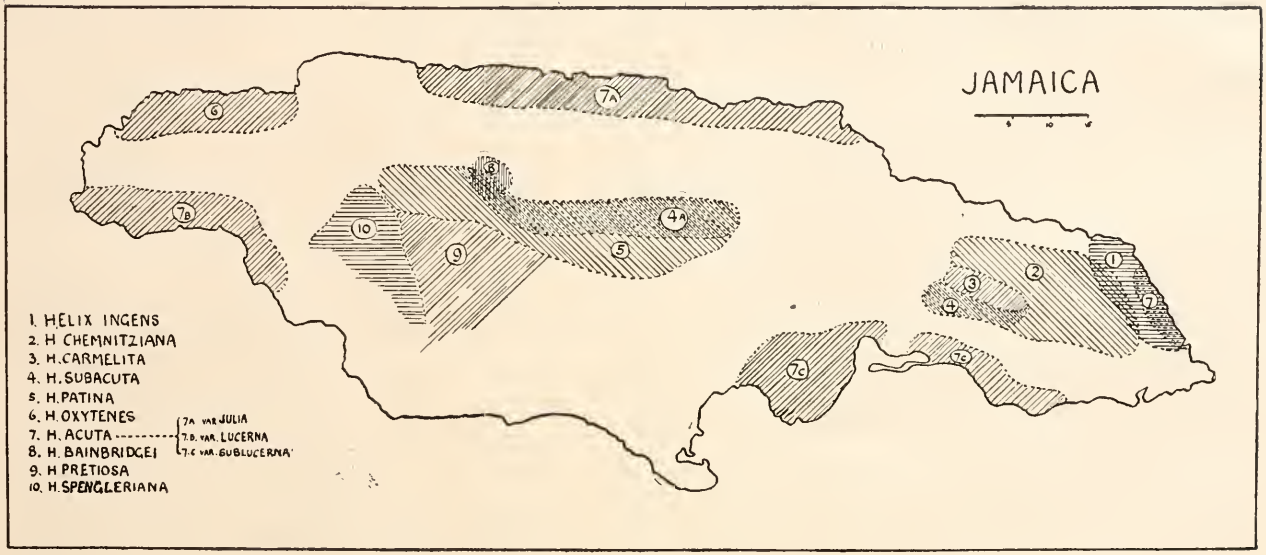
As most of the Jamaican land shells in museums and private collections, are usually labelled "Jamaica," a very vague locality, a few notes giving the areas in which some of the species live may not be out of place.

Belonging to the group of which *H. acuta* is type, seven species are recognizable:

1. *Pleurodonte ingens* (Adams).
2. *Pleurodonte chemnitziana* (Pfr.).
3. *Pleurodonte carmelita* (Fér.).
4. *Pleurodonte subacuta* (Pfr.).
5. *Pleurodonte patina* (Ads.).
6. *Pleurodonte oxytenes* (A. D. Brown).
7. *Pleurodonte acuta* (Lam.).

and three to the group of which *H. bainbridgei* is type.

8. *Pleurodonte bainbridgei* (Pfr.).
9. *Pleurodonte pretiosa* (Ads.).
10. *Pleurodonte spengleriana* (Pfr.).


JAMAICA
1. HELIX INGENS
2. H CHEMNITZIANA
3. H.CARMELITA
4. H.SUBACUTA
5. H.PATINA
6. H.OXYTENES
7. H. ACUTA
8. H. BAINBRIDGEI
9. H PRETIOSA
10. H.SPENGLERIANA
7A. VAR JULIA
7B. VAR. LUCERNA
7C. VAR. SUBLUCERNA
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7B
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1. *Pleurodonte ingens* (C. B. Ad.) is limited to the John Crow Mountains in Portland (No. 1 in map). It is a mountain species. The largest and most typical specimens come from Moore Town and its immediate neighborhood, but living or dead specimens are to be found scattered in all parts of this area amongst the limestone rocks.

The varieties described by Prof. C. B. Adams, viz., *indigna* and *imperforata*, are not local forms, but simply individual variations, all three forms being occasionally found together.

2. *Pleurodonte chemnitziana* (Pfr.) has a much wider range than *P. ingens*, being scattered sparsely on the spurs of the Blue Mountain range, and found more plentifully towards the eastern limits of this area (No. 2). A small pale variety (which is otherwise typical), occurs at Bath, in St. Thomas parish.

3. *Pleurodonte carmelita* (Fer.) is limited to the higher regions of the Blue Mountain range. This species seems to thrive on the shaly soil, while all the other species are most plentiful in the limestone regions.

4. *Pleurodonte subacuta* (Pfr.) apparently has two habitats, the first on the southern slopes of the Blue Mountain range (No. 4 in map), where it is sometimes found in company with both *P. carmelita* and *P. chemnitziana*. The second habitat (No. 4 A) commences about thirty miles west, at Mount Diablo. Thence it occurs plentifully on the mountains running due west to Ulster Spring, where a few stragglers have been found. At present it has not been found in the intermediate space (which is very poor in land shells), but further search may possibly connect these two areas, or it may be found that the form of each area constitutes a distinct species.

5. *Pleurodonte patina* (C. B. Ad.) occupies a very large area. In the extreme east of it the variety *nobilis* of C. B. Adams is found on the slopes of Mount Diablo. A few miles west, at Cave Valley and Aenon Town, the largest and most typical form of *P. patina* crops up, and is undoubtedly the locality where Prof. Adams obtained his types. It spreads west through the higher parts of St. Ann's and Trelawny to Moore Town in St. James, gradually losing its most distinctive characteristics, such as the concavity of the shell above and below the periphery; though retaining both the smooth surface and the single small tooth.

6. *Pleurodonte oxytenes* (A. D. Brown) is limited to Hanover. It is a very clearly marked species, yet subject to considerable individual variation.

7. *Pleurodonte acuta* (Lam.) is found throughout the southern Parishes of St. Elizabeth, Manchester, Clarendon and St. Catherine; though in some localities slightly specialized forms occur, I have not yet been able to arrange them satisfactorily. As a rule the specimens from the higher lands are larger and with small teeth, sometimes only one tooth, whilst the coast and lowland forms are very small, and have large teeth.[1] The variety *acutissima* is not a local race, for in almost every locality of say three or four miles in extent it usually turns up as an acutely carinated form of the local variety.

7 A. *Pleurodonte acuta* (Lam.). The variety *julia* occurs on the hills near the sea on the northern coast. Acutely carinated shells with depressed spire are frequently found amongst the common and typical forms. This variety *julia* may ultimately prove to be the lowland variety of *P. patina*—not of *P. acuta*.

7 B. *Pleurodonte acuta*, var. *lucerna* (Müll.).[2] The most pronounced forms are found on the coast hills of Westmoreland. Further inland occur larger specimens with smaller teeth, and the aperture of the shell much wider. Prof. C. B. Adams' *fuscolabris* is a color variety.

7 C. *Pleurodonte acuta* var. *sublucerna* (Pilsbry) occurs in the lowlands of St. Catherine and along the coast hills of St. Andrew. Near Yallahs there is a very small depressed shell with very large teeth and the umbilicus uncovered. Prof. C. B. Adams mistook this shell for *P. lucerna* of Müller, and so named it in his collection at Amherst College; so when he had the Westmoreland specimens brought to him he described them as new under the name of *fuscolabris*. On the northeast slopes of the John Crow Hills, especially at Quaw Hill, a very large form of this umbilicated shell is found.

8. *Pleurodonte bainbridgei* (Pfr.) (No. 8 in map), occurs only in the neighborhood of Ulster Spring in Trelawny. It is distinguished by having the spire very much depressed.

9. *Pleurodonte pretiosa* (C. B. Ad.) is very widely distributed, being abundant in Manchester (No. 9 on map), and spreading eastward. It is difficult to give any eastern boundaries of this shell, as

[1] Specimens of *P. acuta* were taken near Hope Bay, on the north coast in Portland parish, by C. W. Johnson and W. J. Fox, in 1891.—Eds.

[2] If *P. acuta* and *lucerna* are to be united, the latter will be the species, the former the variety, as *H. acuta* was described nearly fifty years later than *H. lucerna*.—Eds.

weathered specimens are occasionally found in Clarendon, and St. Catherine. Prof. C. B. Adams, who was unacquainted with *bainbridgei* of Pfeiffer, mistook the nearly allied Manchester species for it, and coming across the albino form, described it as the var. *pretiosa* of *bainbridgei;* consequently, his varietal name must be used to designate this species, which is usually of a rich chocolate color.

10. *Pleurodonte spengleriana* (No. 10 in map) is the St. Elizabeth species, and is readily distinguished by its smooth surface.

Before closing these notes I must acknowledge the kindly aid my Master in Conchology, Mr. Henry Vendryes, has always so generously given me. Had it not been for his help I should never have been able to send these communications. I must also acknowledge the aid my friend, Mr. Geo. Nutt, has given in helping me to map out most of the groups of Jamaican land shells.

NOTICES OF NEW LAND SHELLS OF THE JAPANESE EMPIRE.

BY H. A. PILSBRY.

Mandarina hirasei n. sp. Shell umbilicate, depressed-globose, solid and strong, smoothish, slightly marked with growth-striæ, and under a lens seen to be densely striate spirally. Spire low-conoidal, the apex obtuse. Whorls 4½, the last rounded peripherally and beneath, slightly descending in front. Aperture quite oblique, rounded-truncate; peristome thick, expanded, narrowly reflexed below, a little dilated at the columellar insertion, partially covering the umbilicus. Alt. 13, diam. 21 mm.

Chichijima, Ogasawara (Mr. Y. Hirase, No. 860).

Quite unlike any of the known species. The specimens are dead, without cuticle, and white. Like *M. ruschenbergeriana* and *M. pallasiana*, the species is probably extinct.

Hirasea diplomphalus n. sp. Shell very small, shaped like an Ammonite or like *Diplomphalus*, the base perforate, spire rather narrow and deeply sunken, periphery broadly rounded. Whorls 4½, the last sub-angular above. Aperture vertical, narrowly crescentic, the outer lip thickened with a white rib within except near the upper termination. Alt. 3.2, diam. nearly 2 mm.

Chichijima, Ogasawara (Mr. Hirase, No. 863).

Hirasea goniobasis n. sp. Shell sub-perforate, dull brown, acutely

carinate at the periphery, low-conic, striate and terraced above, sub-angular at base. Whorls $5\frac{1}{2}$, slowly widening. Aperture vertical, narrow, trilobed, the outer lip thickened and sub-dentate within, columellar margin thickened. Alt. 2.2, diam. 3.8 mm.

Chichijima, Ogasawara (Mr. Y. Hirase, No. 864).

Hirasiella, gen. nov. Shell small, bullet-shaped, like *Euconulus* or *Kaliella*, polished, sub-perforate, the lip contracted and thickened within. The type of this group would be considered a *Kaliella* were it not for the characters of the peristome, which shows it to be allied to *Hirasea*. The young have a thin lip, like *Kaliella*.

Hirasiella clara n. sp. Shell sub-perforate, glossy and smooth, yellowish, elevated with convex outlines, bullet-shaped, the periphery rounded, base very convex. Whorls $6\frac{3}{4}$, convex. Aperture shortly lunate, contracted, the lip thickened within. Alt. 3, diam. 3 mm.

Chichijima, Ogasawara (Mr. Hirase, No. 867).

Diplommatina dormitor n. sp. Shell similar to *D. cassa* in shape, but a little larger; evenly sculptured with delicate, spaced rib-striæ. Whorls 7, the last narrower and ascending as usual. Aperture sub-circular, the peristome continuous across the parietal wall. Columella toothed below, the tooth or fold moderate, ascending, not enlarged within the last whorl. Palatal fold short. Length 3, diam. 1.5 mm.

Kikaiga-shima, Osumi. Mr. Y. Hirase, no. 870.

This form has been found fossil in a (post-pliocene?) deposit containing many land shells. It differs from *D. cassa* in the much shorter palatal fold, and far less developed columellar lamella within the last whorl. Modern species of the same region, such as *D. saginata* of Oshima, are much smaller. This is the first *Diplommatina* known from Kikaiga-shima.

ALPHEUS HYATT.[1]

Alpheus Hyatt died suddenly of heart disease at Cambridge, Mass., Jan. 15, 1902. He was born at Washington, D. C., April 5, 1838; prepared for college at the Maryland Military Academy and passed a single year at Yale. After a year's travel in Europe he

[1] Taken in part from the excellent memoir by Mr. Samuel Henshaw. *Science*, Vol. XV., p. 300, Feb. 21, 1902.

entered the Lawrence Scientific School at Harvard in 1858, graduating with the degree of Bachelor of Science in 1862.

He enlisted in the volunteer militia in 1862 and at the close of the Civil War was mustered out as Captain of the 47th Massachusetts Infantry. Returning to Cambridge, he resumed his studies under the guidance of Prof. Louis Agassiz, the greater part of his time being directed to work upon the fossil Cephalopoda. In 1867, Mr. Hyatt went to Salem, Mass., and was associated with Messrs. Putnam, Packard, and Morse in the care of the natural history collections of the Essex Insitute and the Peabody Academy of Science, and in the editorial management of the *American Naturalist*. He remained in Salem until 1870, when, on May 4, he was elected custodian of the Boston Society of Natural History. By yearly choice Mr. Hyatt remained the scientific head of the Society until his untimely death.

For the head of a museum of Natural History, Prof. Hyatt had many marked qualifications; his knowledge of zoölogy, of paleozoölogy and geology was extensive; he was skilful in manipulation, suggestive in council, enthusiastic and approachable. His plan that a natural history museum should be arranged so that a visitor on entering should pass from the simpler groups to those more specialized, and that the specimens in each case should be similarly classified, though opposed as impractical, is both sound and feasible.

Prof. Hyatt's reputation as a teacher will rest largely on the work he did for the Teacher's School of Science. His management of this school was very skilful, and his lectures, of which he gave many courses, were uniformly successful.

In the pursuit of his investigations, Prof. Hyatt not only studied the accumulations preserved in museums in this country and abroad, but he partook in active field work; he dredged off the east coast at various points from Labrador to Noank, Conn., and explored many geological horizons in Canada, New England, New York and the far west.

The following are some of his more important papers on mollusca: On the parallelism between the different stages of life in the individual and those of the entire group of the molluscous order Tetrabranchiata. Fossil Cephalopods of the Museum of Comparative Zoölogy. The genesis of the Tertiary species of *Planorbis* at Steinheim. Genera of fossil Cephalopods. Genesis of the Arietidæ.

From the beginning Prof. Hyatt's researches were very largely devoted to evolutionary questions, and to the special study of fossil Cephalopods; at the time of his death he was one of the foremost authorities upon the fossil Cephalopoda. The true value of his work upon this group must be left for the future; memoirs such as the Genera of fossil Cephalopods, and the chapter on the Cephalopoda contributed to the English issue of Zittel's Palæontology cannot be properly estimated by the present generation; they require prolonged and detailed study founded upon large series of specimens. His theory of parallelism based on acceleration and retardation, and his discoveries concerning the laws of development, growth and decline were advocated with persistence and vigor; and while his treatment is not always lucid, he is to be credited as the originator of a distinct school, a school devoted to exact methods of research. The growth of this so-called Hyatt school, never of greater importance than at the time of his death, was a source of sincere gratification to him.

Prof. Hyatt possessed traits of character the worth of which cannot be exaggerated; his private life, though uneventful, was attended with many blessings; he had vigorous health, congenial work and many friends. He enjoyed scientific meetings and general society; his welcome to his own home, where he was the most charming of hosts, can never be forgotten.—C. W. J.

We record with great regret the death of Prof. A. G. Wetherby, which occurred Feb. 15. Further notice will appear next month.

GENERAL NOTES.

Serridens oblongus Cpr.—During one of my recent collecting trips to Pt. Loma and Pacific Beach, I found a number of these interesting little bivalves nestling under the mantle or clinging to the outside of the shell of *Ischnochiton conspicuus*. Their minute size seems to make it especially appropriate for them to depend on their big neighbors for protection and support. The specimens were identified by Dr. Dall, who tells me that *Pristophora* being pre-occupied, the genus has been named *Serridens*. He states that up to the date of my finding them here, only the single valve, found by Dr. Carpenter at San Diego, in 1866, was on record.—F. W. Kelsey, San Diego, Cal.

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